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# Metals Review



**August 1958**



**Merjerie R. Hyslop**  
(See Article, Page 5)

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# Metals Review



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trial Heating Equipment Association; Metal Powder Industries Federation; Metal Treating Institute; Special Libraries Association, Metals Division; and the extensive programs of the American Society for Metals with the new Bill Woodside Memorial Sessions, and Metallurgical Seminar.

# Everything is 4.0 With "Skipper" at the Helm

AN "UNSUNG HERO" is one who promptly executes 'most any old assignment, who carries on beyond the call of duty, who is essential to the success of a project, yet who all too frequently stands in the background when somebody else gets praise and profit from the team's achievements.

Such is Marjorie Rud Hyslop, editor of A.S.M.'s *Review of Metal Literature*, managing editor of *Metal Progress*, boss of the secretarial staff, secretary of A.S.M.'s Advisory Committee on Mechanical Searching of Literature, prime mover in formulating the A.S.M.-S.L.A. Metallurgical Literature Classification. While "Skipper", as she is sometimes called, is on vacation and can't object, this richly deserved, long delayed (yet inadequate) accolade is prepared and printed.

One evening in the early summer vacation of 1927, a relative visited her home and mentioned that there was a temporary typist job in his office. She took the job. The relative was Ray T. Bayless and the office was the American Society for Steel Treating.

Marjorie was such a good typist that Bill Eisenman said in effect: "If you'll major in metallurgy, you can have a permanent job on graduation." She had leanings toward chemistry, but transferred readily to a major in Dr. Lord's department of metallurgy at Ohio State University. That was the chain of lucky events which led to this situation: When the writer of these words reached Cleveland in mid-1930 to be editor of *Metal Progress*, he found two staff members already there—Frank Enright (a graduate from McGraw-Hill), advertising manager, and Marjorie Rud (with a newly-won B.S. degree), secretary. This staff of three produced the first issue of *Metal Progress* from scratch just two months later. Dated September 1930 it contained 70 pages of editorial and 116 pages of advertising.

It was a good issue—typical of Marjorie's performance ever since. *Metals Review* was also started simultaneously as a tabloid carrying the Society news, and she did the editorial work on this single-handedly for many years (as well as acting as secretary to the editor of *Metal Progress*). As soon as the A.S.M. had worked its way through the depression her secretarial job was given to a new girl and Marjorie started on an unending series of special assignments. By this time she had also ac-

quired a new title—Mrs. John A. Hyslop—a move which required no little courage because nobody but nobody hired married women in the dark 1930's.

As indicated at the very outset in listing her present main duties, an increasing portion of her time for the last 10 years has been spent in advanced work on documentation. She has edited every annotation in the *Review of Current Metal Literature* for 14 years—a pioneering project from the first. Then came the necessity for a real classification; the Dewey Decimal Classification, the librarian's stand-by since last century, gave all of 10 lines to the entire field of metallurgy. So the American Society for Metals joined hands with the Metals Division of the Special Libraries Association to fill the need. Marjorie was secretary to the Committee. It held dozens of day-long meetings to hammer out the first edition of the A.S.M.-S.L.A. Metallurgical Literature Classification. It was an instant success. (Everyone knows that a committee is successful if it has a good secretary.) Now in press is a new edition, more an extension than a revision, for the new entries must not interfere with those in the first edition, and even more of a chore than the preparation of the original.

This Classification was adapted for use by a punched card—an embryonic machine. It was logical, then, that she should also take the initiative in the A.S.M.'s research project at Western Reserve University to determine whether electronic machinery could make reliable searches in metallurgical literature. This research started three years ago, and it was thought that it would take five years to find the answer. As it turned out, we already have the answer. It is "Yes". So now Marjorie is deep in a project to organize a saleable information service to the metallurgical industry, and if I know her aright, this will be ready ahead of schedule.

Marjorie and her husband John are enthusiastic yachtsmen. Their "Annie Lee", a 35-ft. cabin cruiser, is virtually their summer home, where they generously dispense open-hearted hospitality. Her only other hobby is kitten-dispensing. Her mother cat, with the improbable name of "Hammy", has brought 61 kittens into the world (up to July 1958) each one of which has been found a good home. Marjorie, fittingly enough, drives a neat little Hillman Minx.

E. E. Thum

## Proposed Constitution Changes

As required by the Constitution of the American Society for Metals, notice is hereby given of amendments to be proposed, for membership approval, at the Annual Meeting of the Society at 9:00 a.m., Wednesday, October 29, 1958, in the Ballroom of the Statler-Hilton Hotel, Cleveland, Ohio. Changes and additions are shown in boldface.

### PRESENT CONSTITUTION

#### ARTICLE I

Section 2 (b). An Honorary Member shall be such person as the Board of Trustees shall determine to have made exceptional contributions to the field of Metallurgy. The total number of living Honorary Members shall not at any time exceed twenty-five (25).

Section 2 (c). An Honorary Life Member shall be such person as the Board of Trustees shall choose to recognize for distinguished service to or cooperation with the Society.

### PROPOSED CHANGE

Section 2 (b). An Honorary Member shall be such person as the Board of Trustees shall determine to be prominent in his field and who through an evidenced appreciation of the importance of metal science has furthered the interests of the metallurgical profession. The total number of living Honorary Members shall not at any time exceed 25.

Section 2 (c). A Distinguished Life Member shall be such person as the Board of Trustees shall choose to recognize for distinguished service to or cooperation with the Society.

# Schaefer Named Secretary, Bayless Temporary Manager

Adolph O. Schaefer, president, Pen-coyd Steel and Forge Corp., Philadelphia, has accepted appointment by the Board of Trustees of the American Society for Metals to the unexpired term of secretary of the Society following the recent death of founder-member William H. Eisenman, who for 40 years had served as national secretary.

In making this announcement, G. M. Young, president of the Society and technical director, Aluminum Co. of Canada, Ltd., Montreal, said that "the Board was most fortunate in securing the services of Mr. Schaefer who is a busy executive, but a man who has always been devoted to the welfare and progress of A.S.M."

Mr. Young also announced that the



R. T. Bayless

of the Philadelphia Chapter, having served as secretary, treasurer and chairman of the local group. A graduate of the University of Pennsylvania, he has been associated with many activities in the metal industry. He received the Delaware Valley Metals Man of the Year Award from the Philadelphia Chapter in 1954.

Mr. Bayless was the Society's first male employee, having been hired in 1922. He was graduated in 1914 from the University of Michigan with a degree in chemical engineering. One of his major responsibilities has been as editor of Transactions, the annual proceedings of the Society.

## Residual Stress Seminar Set for Metal Show Week

Registration for the major "Seminar on Residual Stresses" to be conducted by the American Society for Metals, Oct. 30 through Nov. 1, is now underway and will be limited to 150 persons.

The limitation is necessary both because of the physical size of the as-

sembly room at the Wade Park Manor, Cleveland, and because it is desired to hold the seminar to a size which permits discussion among all participants.

A \$25 deposit on the full \$150, using the coupon on p. 51, will establish registration and assure a room reservation.

Subjects of lectures by the outstanding authority who will be seminar lecturer, Richard Weck, professor, Cambridge University, England, were announced last week by E. E. Thum, editor-in-chief of *Metal Progress* who is serving as program coordinator. J. O. Almen, formerly of General Motors Corp., now retired, has accepted the honorary chairmanship of the meeting. Full schedule of events for the three-day seminar late in Metal Show Week and for one day after the Show's close, was also listed.

Fourteen American experts—mainly engineers who are concerned with gears, welded structures and warpage and heat treatment problems—



A. O. Schaefer

Board had appointed a temporary manager of the Society, an advisory council, and had established a new position of secretary to the Board.

Ray T. Bayless, long-time assistant secretary of the Society, will continue in this position and will become, in addition, temporary manager to direct activities at the headquarters offices. Five A.S.M. staff members appointed to the advisory council were A. P. Ford, Evelyn G. Gardner, Taylor Lyman, Ernest E. Thum and Chester L. Wells.

Miss Gardner was also selected for the newly created position of secretary to the Board of Trustees. Many of the detailed matters pertaining to the office of secretary have for years been taken care of by Miss Gardner in her capacity as secretary to the late Mr. Eisenman. She has an extensive knowledge of all aspects of the Society's operations. She was also appointed secretary of the A.S.M. Foundation for Education and Research.

Mr. Schaefer is a past president of the Society and has been active as a national trustee and in local affairs



J. O. Almen

are currently being invited to take part in the seminar. After each lecture by Dr. Weck, a pair of U. S. authorities will join him on the platform and offer comments and lead wide-open, free-for-all discussions on practical problems.

Dr. Weck joined the Welding Research Council in 1934. He is now director of research of the British Welding Research Association, a post he has held since 1957.

Educated in civil and structural engineering at the Technical University in Prague, Dr. Weck has been a university lecturer at Cambridge and has also lectured at the Instituto de la Soldadura in Madrid; at the Deutsche Verband fuer Schweiss-technik; the University in Belgrade, Yugoslavia; the University in Ljubljana, Yugoslavia; and the Technical University of Hanover.

Dr. Weck is chairman of the Commission of the International Institute of Welding on Residual Stresses, and chairman of the Fatigue Panel of the British Standards Institution's Committee on Girder Bridges.



Richard Weck



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## New Films

### Aluminum Welding Different, Not Difficult

Techniques that make welding of aluminum simple and practical are demonstrated in a 33-min. full-color sound movie produced for Reynolds Metals Co. The 16-mm. film is available without charge for showing to interested organizations. The movie shows that aluminum is easy to join by welding, brazing or soldering, although the techniques are different from those used with other metals. Requests for bookings should be addressed to Reynolds Metals Co., Advertising Distribution Center, Richmond 18, Va.

### Vacuum Melting

A color 16-mm. sound film produced by Universal-Cyclops Steel Corp. shows schematic diagrams and actual installations of the three commercial methods of producing vacuum melted metals, vacuum degassing, induction vacuum melting and consumable electrode arc vacuum melting. This 15-min. film is available by contacting Universal-Cyclops Steel Corp., Bridgeville, Pa., attention PWR.

### Automation Comes to Die Casting

An 18-min., 16-mm. sound film which explains a completely automatic die casting machine for small and medium machine parts called the DCMT Ram. Information regarding the film can be obtained by writing to Dept. K45, CDMT Sales Corp., 80 Shore Rd., Port Washington, N. Y.

### Shell Molding Techniques

A 35-mm. color and sound film, illustrated entirely with artwork, which shows the step-by-step techniques of shell molding. It describes dump-box mixing and sand coating as well as the production of dumped and blown shells and cores. Members of the foundry and related industries

## Outlines Foundry Developments



William J. Mott, General Motors Corp., Discussed Advances That Have Taken Place in the Foundry Industry at a Rochester Meeting. Shown are, from left: M. Finch, vice-chairman; Mr. Mott; and F. Trevett, chairman

### Speaker: William J. Mott General Motors Corp.

William J. Mott, foundry metallurgist, process development section, General Motors Corp., spoke at a

may borrow this 20-min. film without charge from Dept. SM, Monsanto Chemical Co., Springfield, Mass.

### More Than Just Steel

A 30-min. 16-mm. color and sound film tells the story of special purpose sheet steels, from electrical steel and enameling iron in the early years of the century to special zinc-coated and aluminum-coated steels of today. The film also covers standard and special stainless steels, their development and uses. Write Product Information Service, Armco Steel Corp., Middletown, Ohio, or local distribution offices of Modern Talking Pictures, Inc.

meeting of Rochester Chapter on the advances that have taken place in the iron foundries during the past decade. He elaborated extensively on the more recent developments, such as nodular iron and shell molding. His talk was supplemented by slides which showed the properties of various alloy irons, nodular iron, pearlitic iron and permanent mold iron. Examples of shell molded castings were exhibited and discussed, with emphasis on the potential savings when the casting is suited to the process.

Process and quality control were treated at some length. Mr. Mott stated that, in his opinion, the greatest advancement in the foundry industry has been the acceptance by the foundry of the principle of quality control. Each process has a built-in level of quality that cannot be exceeded. By knowing that quality level, which can only be done by controlling the variables of the process, an approach can be made to improving the quality by changing the process.

Data collected in quality control programs can be used advantageously in designing or procuring new equipment. Unfortunately, large capital expenditures are made to increase production capacity without enough thought given to the improvement of quality. All equipment changes should be studied by quality control personnel to determine the effect of these changes on the quality of the product.

Mr. Mott concluded by stating that the foundry that has a sound quality control program will benefit by improved customer relations and lower costs and that the purchaser of castings will benefit since fewer castings will be rejected after costly machining operations.—Reported by James Mancini for Rochester.

## National Officers at Jacksonville



National President G. M. Young Presented a Talk on the "History of Aluminum" at the National Officers Night Meeting of the Jacksonville Chapter. Shown, from left: Mr. Young; W. H. Eisenman, late national secretary; Anthony Breda, secretary; Frank Worley, program chairman; and Stephen Bowes, treasurer. (Reported by Anthony Breda for Jacksonville Chapter)

## Indiana Chapters Hold Annual Symposium



*Speakers and Chairmen Who Participated in the Tenth Annual Spring Symposium of the Combined Indiana Chapters Included, From Left: G. M. Young, President A.S.M.; J. E. LaBelle, General Motors Corp.; Robert McCreery, Chairman, Muncie Chapter; R. A.*

*Flinn, University of Michigan; F. B. Rote, Albion Malleable Iron Co.; H. E. Barnun, Vanadium Corp. of America; Walter Grunden, Symposium Chairman; and Dallas Lunsford, Technical Chairman. Theme of the Symposium was "Cast Iron-New Developments and Applications"*

The Tenth Annual Symposium of the combined Indiana chapters was held at Purdue University, with Muncie Chapter acting as host. The other participating chapters, Indianapolis, Ft. Wayne, Notre Dame, Calumet, Purdue and Terre Haute, were well represented by members and guests.

The central theme of the Symposium was "Cast Iron—New Developments and Applications". President G. M. Young opened the meeting with a short address and then turned the meeting over to Dallas F. Lunsford, chief metallurgist, Perfect Circle Corp., who acted as technical chairman.

J. E. LaBelle, chief metallurgist, Detroit Diesel Division, General Motors Corp., spoke on "Modern Concepts in the Selection of Gray Iron"; Harold E. Barnun, metallurgical engineer, Vanadium Corp. of America, presented a talk on "Ductile Iron"; F. B. Rote, technical director of Albion Malleable Iron Co., discussed "Malleable Iron"; and R. A. Flinn, professor of metallurgical engineering, University of Michigan, summed up the meeting's discussions.

Mr. Lunsford then led the group in an open discussion. The questions asked definitely indicated considerable interest in the newer phases of cast iron which had been discussed throughout the day. — **Reported by Robert R. Myers for Muncie.**

A.S.M. created the Annual Teaching Award in Metallurgy, open to teachers of metallurgy in the United States and Canada. Value \$2000.

## Headquarters Walls Are Rising



*C. H. Lorig, Vice-President A.S.M., Is Shown, Left Center, With E. W. Morgan of the Herron Testing Laboratory, as He Checks the Driving of Piles Which Will Support the Huge Aluminum Dome Over New Headquarters*

Excessive rainstorms drenching the Cleveland area notwithstanding, construction on the American Society for Metals new headquarters building, east of the city, is progressing at "an on-schedule" rate. "It looks like a building now", state site visitors.

Clarence H. Lorig, Columbus, vice-president A.S.M., together with architects and builders, inspected the site July 31 and found foundation walls three-quarters poured. At the same time Dr. Lorig studied the driving of piles that will support the five pylons on which is to rest the revolutionary 166,000 lb. "space lattice."

Erection of the aluminum dome is scheduled to start Aug. 15 with completion by late September. All alu-

minum tubing extruded by the Kaiser Aluminum Co. is now being fabricated by North American Aviation Corp., Columbus, Ohio, prior to assembly.

As an interesting construction feature, the five dome pylons are to be "tied" together by a welded steel tension ring to be laid under the first floor level and covered with concrete.

Over-all foundation construction has advanced to such a point that viewed from the building entrance drive, the spectator gains an immediate impression of the relation of the growing building to the rolling countryside into which it is being "architecturally sculptured".

# A.S.M. Review of Current Metal Literature

An Annotated Survey of Engineering,  
Scientific and Industrial Journals  
and Books Here and Abroad  
Received During the Past Month

Prepared at the Center for Documentation and Communication Research,  
Western Reserve University, Cleveland.  
With the Cooperation of the John Crerar Library, Chicago.



- 368-A. Gold.** J. P. Ryan and Kathleen M. McBreen. *Bureau of Mines Minerals Yearbook*, Preprint, 1956, 21 p.  
Mine production for 1956. (A4p; Au)
- 369-A. Iron Ore.** Horace T. Reno. *Bureau of Mines Minerals Yearbook*, Preprint, 1956, 32 p.  
Salient statistics of domestic iron ore activity, 1955-1956. (A4p, RM-n, Fe)
- 370-A. Secondary Metals—Nonferrous.** Archie J. McDermid. *Bureau of Mines Minerals Yearbook*, Preprint, 1956, 30 p.  
Production figures for secondary recovery of aluminum, antimony, copper and brass, lead, magnesium, nickel, tin and zinc. (A4p, Al1d; Al, Sb, Pb, Cu, Mg, Ni, Sn, Zn)
- 371-A. Tin.** Abbott Renick and John B. Umhau. *Bureau of Mines Minerals Yearbook*, Preprint, 1955, 16 p.  
Domestic and foreign production, consumption and foreign trade. (A-general; Sn)
- 372-A. Uranium.** John E. Crawford. *Bureau of Mines Minerals Yearbook*, Preprint, 1955, 30 p.  
Domestic production, technology, consumption, uses and foreign trade. 37 ref. (A-general; U)
- 373-A. A Promising New Metal.** Gary Wilcox. *Iowa Engineer*, Apr. 1958, p. 29-30.  
Columbium offers excellent promise as a structural metal when temperatures exceed 1800° F. (A-general, 17-57; Cb)
- 374-A. Production of Ferro-Alloys.** G. Volkert. *Iron and Coal Trades Review*, v. 176, Apr. 18, 1958, p. 909-913. (A-general, D8n, D8p; AD-n)
- 375-A. A Milestone in Ferrous Metallurgy.** M. Schofield. *Iron and Steel*, v. 31, May 1958, p. 173-174.  
Note on the role of Abraham Darby and other persons involved in a successful conversion from charcoal to coke for the reduction of iron ore in 18th Century England. (A2; RM-43, Fe)
- 376-A. Uncommon Engineering Metals.** J. P. Denny and L. F. Kendall. *Machine Design*, May 29, 1958, p. 150.  
Properties and applications of zirconium, hafnium, vanadium, columbium, tantalum, chromium and rhenium. (A-general, Zr, Hf, V, Cb, Ta, Cr, Rh)
- 377-A. Research Laboratories.** General Electric Co., Ltd., Wembley. N. L. Harris. *Metal Industry*, v. 92, May 16, 1958, p. 407-408. (A9h, N1c, J2k)
- 378-A. Manganese: Major Strategic Metal.** *Mining and Engineering Journal*, v. 69, Pt. 1, Mar. 28, 1958, p. 515-521. (A-general; Mn)
- 379-A. Low Grade Ores in North American Steel Production.** *Mining Journal*, v. 250, Apr. 18, 1958, p. 441-442. (A4p, Al1a; RM-n)
- 380-A. Titanium Production Developments Including Metallurgy and Alloying.** R. I. Jaffee. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development*, Report 94, 1957, 90 p.  
The past, present and future of the Ti industry discussed in terms of cost and quantities of the metal produced. Various methods for melting, casting and fabrication; techniques of descaling, finishing, joining and machining. 26 ref. (A-general; Ti)
- 381-A. Is This Steel Really Stainless?** F. P. A. Robinson. *South African Engineer*, v. 49, Apr. 1958, p. 17-23.  
10 ref. (A-general; SS)
- 382-A. Bibliography of Nickel.** Ethel M. Pratt and Henry R. Cornwall. *U. S. Geological Survey Bulletin* 1019-k, 1958, 60 p. (A-general, 10-65; Ni)
- 383-A. Bethlehem Steel Improves Acid Pickling Wastes Treatment Plant.** F. B. Milligan. *Wastes Engineering*, v. 29, May 1958, p. 258-260. (A8b, L12g)
- 384-A. (English.) Data on the History of Metallurgy in Hungary.** Pt. 6. A. Schleicher. *Acta Technica*, v. 20, no. 1-2, 1958, p. 137-142.  
Sketches of blast furnace and blast engine dated 1816 giving dimensions and other data. 6 ref. (A2, W17g, Fe)
- 385-A. (French.) Aluminium-Lacq.** G. A. Baudart. *Revue de l'Aluminium*, v. 35, Apr. 1958, p. 390-395.  
One entirely new plant and additional facilities to be installed in an existing plant will increase French aluminum production by 50%. (A4p; Al)
- 386-A. (Portuguese.) Ferrotitanium.** Manuel Chagas Roquete. *Tecnica*, v. 32, Feb. 1958, p. 321-323.  
13 ref. (A-general; AD-n, Fe, Ti)  
M. R. 7on7 7-17 MILLER
- 387-A. Raw Material Supplies and the Future Development of the Iron and Steel Industry.** C. R. Wheeler. *Iron and Steel Institute, Journal*, v. 189, June 1958, p. 101-109.  
Presidential address to the British Iron and Steel Institute. (A4, Al1, D-general; ST)
- 388-A.\* Rare Earths in Industry.** K. Vlasov and B. Kogan. *Journal of Scientific and Industrial Research*, v. 17A, Feb. 1958, p. 41-42.  
Rare-earth metals in steel, light metals and nuclear reactor applications. (A-general, W11p, 17-57; EG-g)
- 389-A. Production Problems of Titanium and Its Alloys.** E. Swainson and R. L. P. Berry. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development*, Report 95, 1957, 29 p.  
Effect of impurities, allotropic transformations, alloying, heat treatment; reduction of Ti; melting techniques; scrap reclamation; primary fabrication including hot working, extrusion and welding. (A-general, C-general, F-general; Ti-b)
- 390-A. Uranium.** John E. Crawford and James Paone. *U. S. Bureau of Mines Minerals Yearbook*, Preprint, 1956, 46 p.  
Production statistics, prices and technology during 1956. (A4p, U)
- 391-A. Titanium.** Jesse A. Miller. *U. S. Bureau of Mines Minerals Yearbook*, Preprint, 1956, 25 p.  
Production and consumption statistics for 1958. (A4p, Ti)
- 392-A. (French.) Nitriding of Iron Was Utilized by the Ancients.** Jean R. Marechal. *Métaux Corrosion-Industries*, no. 391, Mar. 1958, p. 133-137. (A2, J28k; CI)
- 393-A.\* High-Boron Alloy Steels.** T. H. Middleham, J. R. Rait and E. W. Colbeck. *British Nuclear Energy Conference, Journal*, v. 3, Apr. 1958, p. 116-135.  
New technique for the production of steels containing up to about 4.75% B which can be forged, rolled and extruded, and alloys up to about 6% B which can be cast. Methods of manufacture, physical and mechanical properties, and constitution of these steels; applications in thermal nuclear reactors. 23 ref. (A-general, T11, 17-57; AY, B)
- 394-A. Survey of Developments in the Titanium Industry During 1956.** T. H. Janes. *Canadian Department*

The subject coding at the end of the annotations refers to the revised edition of the ASM-SLA Metallurgical Literature Classification. The revision is currently being completed by the A.S.M. Committee on Literature Classification, and will be published in full within the next few months.

of *Mines and Technical Surveys*, M. R. 26, Aug. 1957, 40 p.  
9 ref. (A-general; Ti)

**395-A. Story of Stainless Steel.** Chicago Purchasor, v. 36, Jan. 1958, p. 108.

Mechanical, physical and corrosion resistance properties of the three classifications of stainless steels: chromium-hardenable (400 series); chromium-nonhardenable; chromium-nickel (300 series). (A-general; SS)

**396-A. The Structure of Steel. Pt. 5. Alloy Steels.** Edwin Gregory and Eric N. Simons. *Edgar Allen News*, v. 37, May 1958, p. 101-103.

Role of chromium, vanadium, molybdenum, tungsten and cobalt in steel. (To be continued.) (A-general, 2-60; AY, Cr, V, Mo, W, Co)

**397-A. Raw Materials and the Future Development of the Iron and Steel Industry.** C. R. Wheller. *Iron and Coal Trades Review*, v. 176, May 23, 1958, p. 1213-1218.  
(Alia; ST)

**398-A. Low-Copper Brasses.** Aleksander Krupkowski and Czeslaw Adamski. *Polish Academy of Sciences, Review*, v. 2, July-Dec. 1957, p. 64-70.

Composition and properties of some Polish alloys.  
(A-general, Cu-n)

**399-A.\* The Metallurgy of Beryllium.** I. E. Nennham. *Research Applied in Industry*, v. 11, May 1958, p. 185-191.

Problems in developing Be are centered around mineral concentration, chemical extraction and purification, and metal reduction and fabrication. The danger of Be-induced health hazards is also a serious deterrent to the economical exploitation of the metal and its compounds. 25 ref.  
(A-general, Al; Be)

**400-A. Lithium and Its Compounds.** D. S. Laidler. *Royal Institute of Chemistry, Lectures, Monographs and Reports*, 1957, no. 6, 33 p.  
(A-general; Li)

**401-A. Aluminum.** R. August Heindl, Arden C. Sullivan and Mary E. Trought. *U. S. Bureau of Mines Minerals Yearbook*, Preprint, 1956, 27 p.  
Production, technology and uses of Al in U. S. and abroad.  
(A4, 17-57; Al)

**402-A. Copper.** A. D. McMahon and Gertrude N. Greenspoon. *U. S. Bureau of Mines Minerals Yearbook*, Preprint, 1956, 48 p.

Production statistics, prices and technology during 1956. (A4p; Cu)

**403-A. Manganese.** Gilbert L. DeHuff and Teresa Fratta. *U. S. Bureau of Mines Yearbook*, Preprint, 1956, 24 p.

Production statistics, prices and technology during 1956. (A4p; Mn)

**404-A. Tin.** Abbott Renick and John B. Umhau. *U. S. Bureau of Mines Minerals Yearbook*, Preprint, 1956, 31 p.

Production statistics, prices and technology during 1956. (A4p; Sn)

**405-A. Tungsten.** R. W. Holliday and Mary J. Burke. *U. S. Bureau of Mines, Yearbook*, Preprint, 1956, 20 p.

Production statistics, prices and technology during 1956. (A4p; W)

**406-A. Zinc.** O. M. Bishop, A. J. Martin and Esther B. Miller. *U. S. Bureau of Mines Yearbook*, Preprint, 1956, 46 p.

Production statistics, prices and technology during 1956. (A4p; Zn)

**407-A. Thorium, Uranium Stockpiling, and Nuclear Fuel.** David F. Shaw. Paper from "Recent Developments in Uranium Milling Technology", Uranium Institute of America, p. 88-99.

(Alia, T11g; Th, U)

**408-A. Developments in Steel and Titanium.** *Aircraft Engineering*, v. 30, Mar. 1958, p. 72.

At William Jennings and Sons Ltd., Brightside Works, Sheffield, England. (A-general; ST, Ti)

**409-A. Uncommon Engineering Metals.** J. P. Denny and L. F. Kendall, Jr. *American Society of Mechanical Engineers*, Paper no. 58-MD-4, Apr. 1958, 9 p.

Physical and mechanical properties, uses of zirconium, hafnium, vanadium, columbium, tantalum, chromium and rhenium. (A-general; Zr, Hf, V, Nb, Ta, Cr, Rh)

**410-A. Rapid Increase of Use and Production of Sodium Metal.** W. Schweisheimer. *Australasian Engineer*, v. 50, Nov. 7, 1957, p. 61-63.  
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**411-A. Magnesium and Its Alloys.** R. Westwood. *Australasian Engineer*, v. 50, Mar. 7, 1958, p. 63-68.  
4 ref. (A-general; Mg)

**412-A. The Process Uses of Bituminous Coal in Ferrous Metallurgy.** R. A. Glenn and J. W. Jacoby. *Bituminous Coal Research*, v. 18, no. 1, Spring 1958, p. 11-14.  
(A-general; RM-142)

**413-A. Evaluation of the Blaw-Knox Ruthner Pilot Plant Program.** J. H. Strassburger. *Blast Furnace and Steel Plant*, v. 46, June 1958, p. 587-594.

Process for pickling waste treatment compares favorably with existing processes for recovery of usable  $H_2SO_4$ , HCl, and FeO.  
(A8b, L12g)

**414-A. A New Look at Lithium Metal.** Marshall Sittig. *British Chemical Engineering*, v. 3, Mar. 1958, p. 130-133.  
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**415-A. Manganese.** L. Sanderson. *Canadian Mining Journal*, v. 78, Nov. 1957, p. 112-113.  
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(A4p; Ti, Zr, Hf)

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(A-general; EG-g)

**418-A. Lithium.** D. R. Williamson. *Colorado School of Mines, Mineral Industries Bulletin*, v. 1, Mar. 1958, 8 p.  
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**420-A. Uses of Fluorspar Associated With the Aluminum and Steel Industries.** Richard E. Kerr. *Engineering Sciences, Technical Paper*, v. 4, no. 43, 1957, 12 p.  
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**421-A. Four Reports on Russian Technology.** Metallurgy. J. H. Hol-

lomon, W. R. Hibbard, C. P. Bean and C. L. Rouault. *General Electric Review*, v. 61, Mar. 1958, p. 10-12.

Training of metallurgists, basic research and current state of technology in the Soviet Union as seen first-hand by four General Electric scientists. (A-general, A3, A9)

**422-A. Recent Trends in Mineral Development in the U.S.S.R. and Western Europe.** B. C. Roy. *Geological, Mining and Metallurgical Society of India, Bulletin*, v. 19, Mar. 1957, p. 1-56.

General discussion of geological surveys and mineral exploitation.  
(Alia)

**423-A. National Metallurgical Laboratory—Seven Years of Progress.** *Indian and Eastern Engineer*, v. 122, Jan. 1958, p. 41-42, 45.

Research activity at Jamshedpur, India. (A9h)

**424-A. Canadian Occurrences of Columbium and Tantalum Minerals.** *Mining Journal*, v. 250, Mar. 28, 1958, p. 352-353.  
(Alia; Ta, Nb, RM-n)

**425-A. Beryllium Handling—Reducing the Health Risk.** R. O. R. Brooks. *Nuclear Power*, v. 3, Mar. 1958, p. 112-114.  
(A7, A5a; Be)

**426-A. Bauxite.** Richard C. Willmot, Arden C. Sullivan and Mary E. Trought. *U. S. Bureau of Mines Minerals Yearbook*, Preprint, 1956, 22 p.  
Production statistics and prices for 1956. 15 ref.  
(A4p, A4s; Al, RM-n)

**427-A. Beryllium.** Donald E. Eilertsen. *U. S. Bureau of Mines Minerals Yearbook*, Preprint, 1956, 6 p.  
Production and consumption for 1956. 9 ref. (A4p; Be)

**428-A. Cadmium.** Arnold M. Lansche. *U. S. Bureau of Mines Minerals Yearbook*, Preprint, 1956, 10 p.  
Production statistics and prices for 1956. 4 ref. (A4p, A4s; Cd)

**429-A. Chromium.** Wilmer McInnis and Hilda V. Heidrich. *U. S. Bureau of Mines Minerals Yearbook*, Preprint, 1956, 16 p.  
Production and consumption during 1956. 27 ref. (A4p; Cr)

**430-A. Cobalt.** Hubert W. Davis and Charlotte R. Buck. *U. S. Bureau of Mines Minerals Yearbook*, Preprint, 1956, 14 p.  
Production and consumption during 1956. 19 ref. (A4p; Co)

**431-A. Iron and Steel.** James C. O. Harris. *U. S. Bureau of Mines Minerals Yearbook*, Preprint, 1956, 27 p.  
Production statistics and prices for 1956. 29 ref. (A4p, A4s; Fe, ST)

**432-A. Magnesium.** H. B. Camstock. *U. S. Bureau of Mines Minerals Yearbook*, Preprint, 1956, 10 p.  
Production statistics and prices for 1956. 31 ref. (A4p, A4s; Mg)

**433-A. Platinum-Group Metals.** J. P. Ryan and Kathleen M. McBreen. *U. S. Bureau of Mines Minerals Yearbook*, Preprint, 1956, 16 p.  
Production statistics and prices for 1956. 12 ref. (A4p, A4s; EG-c)

**434-A. Vanadium.** Phillip M. Busch and Kathleen McNulty. *U. S. Bureau of Mines Mineral Yearbook*, Preprint, 1956, 10 p.  
Production statistics and prices for 1956. (A4p, A4s; V)

**435-A. (German.) Austria's Contribution to the Development of Metallurgy of Iron.** H. Malzacher. *Oesterreichische Ingenieur Zeitschrift*, no. 4, Apr. 1958, p. 173-175.  
(A-general; Fe)

**436-A.** (Russian.) **Production of Non-aging Boron Steel and Its Properties.** Kh. Levinzon and A. D. Litvinenko. *Stat.*, v. 18, Mar. 1958, p. 249-252.

A review of recent literature. 9 ref. (A-general; AY, B)

**437-A.** (Pamphlet.) **A Perspective of Molybdenum-Base Alloys.** Alvin J. Herzig. *American Society for Testing Materials*, 1957, 33 p.

Sixth Gillett Memorial Lecture. Properties, applications, effect of alloying additions and fabrication. (A-general; Mo)

**438-A.** (Book.) **Kaiser Aluminum Sheet and Plate Product Information.** 2nd Ed. 1958. 308 p. Kaiser Aluminum & Chemical Sales, Inc., 919 N. Michigan Ave., Chicago 11, Ill. \$5.

Manufacture, availability, physical and chemical attributes; basic facts helpful in the proper selection and use of Al sheet and plate alloys; fabrication and finishing methods. (A-general; Al, 4-53)

**439-A.** (Book.) **Metal Industry Handbook and Directory.** 544 p. 1958. Iliffe and Sons Ltd., Dorset House, Stamford St., S.E.1, London, England. (Free.)

General properties of metals and alloys; data and tables; electroplating and allied processes; directories of trade names, metal and allied trades associations and scientific and technical institutions. (A-general; 11-67)

**440-A.** (Book.) **Metal Statistics.** 51st Ed., 1958. 400 p. American Metal Market, 18 Cliff St., New York 38, N. Y. \$3.50.

Covers important metals from Al and Be to V and Zn. Approximately one-third of the data deals with iron and steel. Among the new data tables added this year are bauxite production, chromite production and shipments of Al foil. (A4)

**441-A.** (Book.) **Safety in Welding and Cutting.** American Standard Z49.1-1958. 49 p. 1958. American Welding Society, 33 W. 39th St., New York 18, N. Y. \$2.

(A7, K1, K3, G22h)

**442-A.** (Book.) **Wire Industry Encyclopaedic Handbook.** 484 p. 1958. Wire Industry, Ltd., 33 Furnival St., London, E.C.4, England. (Free.)

Glossary, tables, directories of manufacturers and associations. (A-general, 4-61, 11-67)

**443-A.** (Book.) **Yearbook of the American Bureau of Metal Statistics.** 136 p. June 1958. American Bureau of Metal Statistics, 50 Broadway, New York, N. Y. \$4.50.

Statistical information concerning mine production, smelter production, consumption, imports and exports and other economic statistics on a world-wide basis. (A4p)

**444-A.** (Book—German.) **Metals in Mechanical Engineering.** 2nd Ed. E. Bickel. 439 p. 1958. Lange & Springer, Reichpietschufer 20, Berlin W 35, Germany. DM. 37.50.

Selection of metals for various applications; structure of metals; properties and testing. (A-general, 17-57)

## Ore and Material Preparation

**137-B.** **Ore Dressing Investigations. Gravity Concentration and Magnetic Separation of Ilmenite Beach Sands** From Capel, W. A. E. Tasker. *University of Melbourne, Commonwealth*

*Scientific and Industrial Research Organization* no. 697, Sept. 16, 1957, 3 p.

(B14g, B14j; Ti)

**138-B.** **Properties of Refractories.** *Industrial Heating*, v. 25, May 1958, p. 1016, 1018, 1020, 1022.

Abstracts of papers presented at the annual meeting of the American Ceramic Society, Dallas, Tex. (B19; RM-h)

**139-B.** **High-Alumina Refractories.** D. S. Rutman, L. V. Vinogradova, K. A. Krasotin and D. E. Min'kov. *Iron and Steel*, v. 31, May 1958, p. 184-185. (From *Ogneupory*, v. 12, 1957, p. 546-549.)

5 ref. (B19, D9p, W18n; RM-h40)

**140-B.\*** **Oxygen and the Steel Plant: Maintenance Experience With O<sub>2</sub> Plants at Sparrows Point.** A. Stutzer. *Iron and Steel Engineer*, v. 35, May 1958, p. 84-86.

Six oxygen units of 7000 cu. ft. per hr. are serviced with an approximate downtime of 3% of possible total operating time. This seemingly high percentage permits maintenance of a continuous flow of nitrogen from oxygen units for prepared atmosphere consumed by box annealing furnaces. (B25, J2k; O)

**141-B.** **New Developments in Gold Reduction.** *Mining Journal*, v. 250, Apr. 18, 1958, p. 440-441.

(B13, B14; Au)

**142-B.** **Greenland Lead-Zinc Mine Beats Elements With Underground Mill.** Bertil Astlund and P. H. Fahlstrom. *Mining World*, v. 19, Nov. 1957, p. 46-50.

(B14h; Pb, Zn)

**143-B.** **New Pellet Hardening Method Uses Grate and Kiln Firing.** W. F. Stowasser. *Mining World*, v. 19, Nov. 1957, p. 59-60.

New process for pelletizing and heat treating magnetite concentrates to form hard, durable pellets for blast furnaces. (B16b; Fe)

**144-B.** **Three Ways to Handle Scrap.** *Steel*, v. 142, June 9, 1958, p. 96, 99.

(B23; ST)

**145-B.** **Iron Ore Preparation in the USSR.** I. P. Bardine. *Iron and Coal Trades Review*, v. 176, May 16, 1958, p. 1153-1154.

(B16, Fe)

**146-B.** **Hydrometallurgical Separations.** Merrill F. McCarty and Eugene E. Woodward. *Mines Magazine*, v. 48, Mar. 1958, p. 25-27.

In uranium recovery. (B14; U, RM-n)

**147-B.** **Titania Concentrate From Ilmenite and Its Chlorination Properties.** Seppo Wilska. *Suomen Kemistilehti*, v. 31, no. 2, 1958, p. 156-160.

(B14; Ti)

**148-B.\*** (Italian.) **Refractoriness Tests on a Part of the System CaO-MgO-SiO<sub>2</sub>-Al<sub>2</sub>O<sub>3</sub>.** R. Zoja. *Metallurgia Italiana*, v. 50, Mar. 1958, p. 85-90.

Spherical test pieces composed of two half-spheres 20 mm. in diameter, fitted together, were placed in tapered cavities in preheated disk of refractory material. Disks were held at desired temperature (varying between 1350 and 1550° C. for different runs) for 20 min., and agglomeration, softening and melting of specimens was observed. Systems tested were those having 5% and 10% Al<sub>2</sub>O<sub>3</sub>, 10% to 50% SiO<sub>2</sub>, 25% to 80% MgO and 5% to 35% CaO. (B19d)

**149-B.\*** (Italian.) **Possibilities of X-Ray Diffraction Analysis of Refractories.** E. Moltoni and G. Giuseppetti.

*Metallurgia Italiana*, v. 50, Mar. 1958, p. 91-100.

Advantages of X-ray diffraction study of silica, alumina-silica, dolomite, magnesite and special refractories for determination of crystal size, structure, composition, texture, impurities and speed of conversion. Tabulation of powder spectra of 54 crystalline compounds having refractory interest. 47 ref. (B19d)

**150-B.\*** (Italian.) **Investigation of the Resistance of an Alumina-Silica Refractory to Sudden Cooling Tests.** L. Massimilla and S. Bracale. *Metallurgia Italiana*, v. 50, Mar. 1958, p. 101-105.

Both theory of maximum stress and Weibull statistical theory are shown to provide reliable data on resistance of panels of refractory brick to thermal cycles when mathematical results are compared with those obtained by actual testing. In case studied, material resisted fracture when subjected to sudden temperature drops from 600 to 20° C. Drops from higher temperatures caused fracture even though cooling was gradual. 6 ref. (B19d)

**151-B.** **High-Temperature Strengths of Basic Refractories.** E. I. Greaves and J. MacKenzie. *British Ceramic Society, Transactions*, v. 57, Apr. 1958, p. 187-198.

A good correlation exists between high-temperature strength, creep characteristics and service performance of openhearth furnace roofs. (B19d, D2; RM-h)

**152-B.** **The Spalling of Silica Bricks.** J. Hargreaves. *British Ceramic Society, Transactions*, v. 57, May 1958, p. 242-257.

(B19; RM-h)

**153-B.** **Influence of Porosity on Silica-Roof Performance.** H. R. Lahr and C. W. Hardy. *British Ceramic Society, Transactions*, v. 57, May 1958, p. 271-284.

Porosities in the range of 15 to 30% have a significant but small influence on openhearth roof performances, the lower porosity bricks being superior. (B19d, D2; RM-h)

**154-B.** **Mining in Finland. Pt. 4. Mining, Milling, Smelting Outokumpu Copper Ore.** C. Mamen. *Canadian Mining Journal*, v. 79, May 1958, p. 73-81.

(B-general, C-general; Cu)

**155-B.** **How Bacteria Leaches Low-Grade Ores.** *Engineering and Mining Journal*, v. 159, June 1958, p. 89-91.

Several strains of bacteria are able to live and multiply in relatively high concentrations of dissolved Cu, and can be used to leach and recover Cu, Mo and Zn from their sulphide and mixed oxide-sulphide ores. (B14, Cu, Mo, Zn)

**156-B.\*** **Fine Grinding at Supercritical Speed.** R. T. Hukki. *Mining Engineering*, v. 10, *AIME Transactions*, v. 211, May 1958, p. 581-591.

Relationship between mill grinding capacity and specific gravity of grinding media, shape of media, mill speed, surface of mill lining, energy used in grinding at subcritical and supercritical speeds. 19 ref. (B13c)

**157-B.** **Grinding Ball Size Selection.** Fred C. Bond. *Mining Engineering*, v. 10, *AIME Transactions*, v. 211, May 1958, p. 592-595.

Empirical and theoretical equations for calculating proper sizes of ball and rods to be added to tumbling grinding mills. Table of ball and rod weights, volume and sur-

face area. Proper ball and rod size distribution for starting mill. (B13c, 1-52)

**158-B.** The Relative Resistances to Basic Slags of Magnesite and Dolomite. W. F. Ford and J. White. *Refractories Journal*, no. 4, Apr. 1958, p. 171-174. (B19, D-general; RM-h, RM-q)

**159-B.** Studies on the Flotation of Pyrites. Effect of Roasting. Hiromu Fushimi. *Waseda University, School of Science and Engineering, Memoirs*, no. 21, 1957, p. 91-100. (B14h, B15; Fe)

**160-B.\*** (Czech.) Improvement in the Production of Vanadium From Slags. Drahomir Trojka and Karel Palka. *Hutnické Listy*, v. 13, no. 4, 1958, p. 371-384.

Common properties of vanadium and methods of preparation. Effect of different conditions on V yield in the oxidizing roasting of V slags. Maximum fineness of roasting charge, rapid cooling from roasting temperature of 820°C. and presence of sodium chloride at rate of 8% elevate the yield of V. 7 ref. (B15n, A11d; V, RM-q)

**161-B.\*** (German.) Comparative Flotation Experiments With Amines and Xanthates Using Sulphide Ores. Urmas Runolinnä. *Zeitschrift für Erzbau und Metallhüttenwesen*, v. 11, May 1958, p. 199-209.

Use of amines as flotation reagents; chemical properties of amines; comparative experiments with amines and xanthates on four various Finnish ores. Influence of liquid preparation, temperature, fineness of grinding, regulators, auxiliary collectors and spumers. 24 ref. (B14h)

**162-B.** Treatment Tests on an Oxidized Copper-Cobalt-Gold Ore From Carlow Castle, Roebourne, Western Australia. *Australia Scientific and Industrial Research Organization, Ore Dressing Investigations*, Report no. 681, Mar. 18, 1958, 20 p. (B11, Cu, Co, Au, RM-n)

**163-B.** New Process for Heat Treating Iron Ore Concentrates. *Canadian Mining Journal*, v. 78, Nov. 1957, p. 98-99. (B16b; Fe)

**164-B.** International Mineral Dressing Congress, Stockholm, Sweden. *Canadian Mining Journal*, v. 78, Nov. 1957, p. 100-105. (B13, B14, B15, B16)

**165-B.** Tougher Taconite Pellets for Blast Furnaces. *Chemical Processing*, v. 20, Dec. 1957, p. 104-106. Lower fuel and maintenance costs plus virtual elimination of pellet breakage are advantages cited in new process. (B16b, Fe)

**166-B.** Use of Fractional Factorial Designs in Sintering Experiments. C. J. Davis and J. D. Hromi. *Engineering Sciences, Technical Paper*, v. 4, no. 61, 1957, 12 p.

Tests point up increased production rates and decreased coke rate realized through use of high percent sinter in blast furnace burden. 8 ref. (B16, D1a, 1-54; Fe)

**167-B.** Current Electric Furnace Refractories Practice. A. H. Thomson and L. A. Stoyell. *Industrial Heating*, v. 25, June 1958, p. 1215-1216, 1218, 1220.

Canadian basic refractory practice in electric furnaces and self-baking refractory mix. (To be continued). (B19, W17j; RM-h)

**168-B.** Some Improvements in Sinter Plant Ignition. W. C. E. Bell. *Iron and Coal Trades Review*, v. 175, Nov. 8, 1957, p. 1093-1096.

Adoption of an ignition hood for coke oven gas firing and improvement in sinter quality which resulted. (B16a, 1-52; Fe)

**169-B.\*** Production of Sinter by the Intermittent Process. Paul Thomas. *Iron and Coal Trades Review*, v. 176, Mar. 14, 1958, p. 615-618.

GHH pan sintering process in which pans of sinter are treated individually, instead of passing continuously around an endless belt mechanism. Advantage is greater flexibility. (B16a)

**170-B.** Cyclone Classification at Chuquicamata. D. S. Sanders. *Mining Congress Journal*, v. 44, Mar. 1958, p. 55-58, 72.

Using cyclones in place of spiral classifiers. (B13; Cu)

**171-B.** (Book.) Low Grade Ores. A Survey of American Research Methods. Jan. 1958. 158 p. Organization for European Economic Co-Operation, 1346 Connecticut Ave. N.W., Washington 6, D. C. \$3.

Report by members of European productivity agency on a survey made of research facilities, current research, processes presently used for underdevelopment, ore dressing, beneficiation and concentration for metals including Fe, Ni, Co, Cr, Mo, Ta, Nb, V, Ti, W, Cu, Zn, Cd, Pb, Sn, Al, Mg, Au, Ag, Ge, Li, Zr, Se and Mg. 118 ref. (B14)

## Extraction and Refining

**184-C.** Continuous Rod and Tube Casting Process. *Australasian Manufacturer*, v. 43, Apr. 19, 1958, p. 84-89. (C5q, 4-55, 4-60)

**185-C.** Zone Refining of Impure Copper. *Industrial Heating*, v. 25, May 1958, p. 918, 922. (C28k; Cu)

**186-C.** Study of Niobium for High-Temperature Applications Through Zone Melting. *Industrial Heating*, v. 25, May 1958, p. 924-926. (C28k; Nb)

**187-C.\*** UF<sub>6</sub> Production in Uranium Mills. Ray S. Long, David A. Ellis and James E. Magner. *Mining Congress Journal*, v. 44, Apr. 1958, p. 74-76.

Proposal for yellow cake elimination by means of an alternative process involving two-stage solvent extraction with mono-alkyl or di-alkyl phosphate in kerosene, followed by stripping with hydrochloric acid. UF<sub>6</sub> is precipitated with HF. (C19n; U)

**188-C.** Use of Tri-n-Octylphosphine Oxide in the Solvent Extraction of Zirconium. J. C. White and W. J. Ross. Oak Ridge National Laboratory. U. S. Atomic Energy Commission, ORNL-2498, Apr. 24, 1958, 37 p. (Order from Office of Technical Services, Washington 25, D. C.) \$1.25. 9 ref. (C19; Zr)

**189-C.\*** (English.) Experiments on the Reduction of Dolomite for Magnesium Production. T. G. Gedeon. *Acta Technica*, v. 20, no. 3-4, 1958, p. 229-250.

Laboratory and pilot plant investigation of the reduction of Hungarian dolomite by means of ferro-

silicon, silicon-aluminum, aluminum, and silicon-calcium. Data on percentage yield of metallic Mg, chemical composition, current consumption, reaction temperature and time. Higher yield with lower current consumption obtained with Si-Al than with ferrosilicon as reducing agent. 15 ref. (C26; Mg, Si, Al, Ca)

**190-C.\*** (German.) Electrolytic Separation of Indium and Thallium. W. Kangro and Fr. Weingärtner. *Zeitschrift für Erzbau und Metallhüttenwesen*, v. 11, Feb. 1958, p. 70-72.

Electrolytic separation of In and Tl by means of different oxidizability of their univalent ions: (1) solution extraction of 80-90% Tl (99.94% purity); (2) extraction of remaining Tl and intermediate product (Tl with 10% In) by repeated electrolysis; (3) extraction of pure In (99.97% purity) by electrolysis. (C23n; In, Tl)

**191-C.** (German.) Reduction of Titanium Tetrachloride by Sodium-Zinc Melts. Walter Häusler. *Zeitschrift für Metallkunde*, v. 49, Apr. 1958, p. 206-209.

Attempt to replace mercury by zinc in Hohn's method of titanium refining. Physical and chemical fundamentals. Advantages of Zn are low cost, low vapor pressure, high dissolving ability. Disadvantage is low yield. (C26, Tl, Na, Zn)

**192-C.** High Purity Manganese Via Electrolysis. C. H. Chilton. *Chemical Engineering*, May 19, 1958, p. 136-139. Flowsheet. (C23p; Mn-a)

**193-C.** Scale-Up Problems in the Plutonium Separations Program. O. F. Hill and V. R. Cooper. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 599-602. (C28; Pu)

**194-C.** Ion Exchange Separation of Uranium From Thorium. R. H. Fiorier, G. D. Calkins, G. A. Lutz and A. E. Bearse. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 613-616. (C19s, U, Th)

**195-C.** Uranium Ore Reduction. The French Process. Maurice Moyal. *Nuclear Power*, no. 3/6, Mar. 1958, p. 125-127.

During extraction into pure uranium mattes, the ores undergo three stages of treatment: the concentrate is turned into sodium uranate; the uranate is processed into pure oxide; the oxide is reduced to metal. Treatment varies according to the origin, type and degree of concentration of the ores. (C19; U)

**196-C.** Casting and Fabrication of Natural Uranium. F. L. Cuthbert. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 29-45.

Preparation of uranium metal suitable for melting stock to produce ingots or other shapes. Recent development work involved in vacuum-induction casting, centrifugal casting and melting under a protective salt cover. Fabrication of natural uranium fuel elements by rolling, swaging and machining; heat treatment. Preparation of uranium-metal shapes utilizing powder-metallurgy techniques. (C5, F23, F25, G17, H-general, J-general; U)

**197-C.** Bomb Reduction, Forging, and Extrusion of Uranium and Urani-

**um Alloys.** J. A. Fellows. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, TID-7546, p. 46-74.

Process for the production of pure uranium in 1.5-ton masses by a bomb reduction of  $\text{VF}_4$  with magnesium. 26 ref. (C26; U, Mg)

**198-C.\* The Preparation of Plutonium-Aluminum and Other Plutonium Alloys.** C. J. C. Runnalls. *Atomic Energy of Canada Ltd., AECL* No. 593, Jan. 1958, 31 p.

Plutonium trifluoride is reduced more rapidly at 900° C. than at 1125° C. with liquid Al owing to the evolution of gaseous Al monofluoride at the lower temperature. Plutonium dioxide is reduced readily by an excess of liquid Al at 1200° C. in the presence of liquid cryolite, forming Pu-Al alloys with a Pu yield above 99%. 15 ref. (C26; Pu, Al)

**199-C. Pressure Leaching of a Manganese Ore.** Pt. 1. Kinetic Aspects. R. J. Cornelius and J. T. Woodcock. *Australasian Institute of Mining and Metallurgy, Proceedings*, no. 185, Mar. 1958, p. 65-133. 42 ref. (C19n, 3-74; Mn)

**200-C. AEC Sifts Process Routes to Low-Cost Fuel Recovery.** *Chemical Week*, v. 82, June 14, 1958, p. 39-44. Purex and Redox "hot" solvent extraction processes. (C19; U)

**201-C. The Production of Copper and Sulphur by the Electro-Decomposition of Cuprous Sulphide.** T. P. Hoar and R. G. Ward. *Institution of Mining and Metallurgy, Bulletin*, no. 618, May 1958, p. 393-410.

Uses molten cuprous sulphide as cathode and anode and molten barium chloride as electrolyte. 17 ref. (C23; Co)

**202-C. Final Treatment of Uranium Concentrates.** Peter Holz. *South African Mining and Engineering Journal*, v. 69, Apr. 18, 1958, p. 649, 651.

At Calced Products (Pty.) Ltd., Johannesburg, South Africa. (C-general; U)

**203-C.\* A Reconnaissance of Uranium Process Technology.** Richard H. Kennedy. Paper from "Recent Developments in Uranium Milling Technology", *Uranium Institute of America*, p. 11-23.

Background of U ore processing; ion exchange process, resin-in-pulp and solvent extraction processes, outline of U concentrate processing. (C19; U)

**204-C. Uranium Concentrate Specifications.** Archie E. Ruehle. Paper from "Recent Development in Uranium Milling Technology", *Uranium Institute of America*, p. 25-32.

Chemical problems of refining. (C-general; U)

**205-C. Recent Studies in Dapex Processing for Uranium and Amex Processing for Thorium.** Keith B. Brown. Paper from "Recent Developments in Uranium Milling Technology", *Uranium Institute of America*, p. 33-43.

Solvent extraction processes. (C19; U, Th)

**206-C. Continuous Ion Exchanger Treatment for Ore Leach Liquors.** Irwin Higgins. Paper from "Recent Developments in Uranium Milling Technology", *Uranium Institute of America*, p. 45-58. (C19s; U)

**207-C. Recent Developments in the Study of Uraniferous Lignite Treatment.** William D. Charles. Paper from "Recent Developments in Ura-

nium Milling Technology", *Uranium Institute of America*, p. 59-73.

Roasting, leaching, and solvent extraction. Lignite can be treated successfully with only slightly lower U recoveries than normally found, although the cost will be greater per pound of  $\text{U}_3\text{O}_8$ . (C19, B15; U)

**208-C. Solvent Leaching of Uranium Ore.** Richard H. Bailes. Paper from "Recent Developments in Uranium Milling Technology", *Uranium Institute of America*, p. 75-85.

Direct solvent leaching process for recovering U from carnotite-type ores using alkyl phosphate extractants (C19; U)

**209-C. (English.) An Improved Process for the Caustic Soda Decomposition of Monazite.** G. A. Meerson, G. E. Kaplan and T. A. Uspenskaya. *Soviet Journal of Atomic Energy*, v. 3, no. 9, 1957. 18 ref. (C19r; Th)

**210-C.\* Preparation of Plutonium-Aluminum Alloys.** O. J. C. Runnalls. *Atomic Energy of Canada Ltd., AECL* no. 458, June 1957, 13 p.

Direct reduction of  $\text{PuF}_3$  and  $\text{PuO}_2$  with liquid Al.  $\text{PuF}_3$  is reduced more rapidly at 900 than at 1100° C. owing to the evolution of gaseous AlF, which is stable at the former temperature. Plutonium yield averaged 95%. Alloys for a second fuel rod were prepared by the Al reduction of a pressed  $\text{PuO}_2$ -cryolite mixture at 1100° C., with a plutonium yield of 98%. 7 ref. (C26; Al, Pu)

**211-C. Vapor Pressure of Lithium in the Reduction of Lithium Oxide by Silicon.** W. Morris and L. M. Pidgion. *Canadian Journal of Chemistry*, v. 36, June 1958, p. 910-914. 8 ref. (C26; Li)

**212-C. Sodium-Reduction Route Yields Titanium.** *Chemical Engineering*, v. 65, Mar. 10, 1958, p. 124-127. (C26; Ti, Na)

**213-C. Lithium: Its Extraction From Western Australian Spodumene Ore.** I. J. Bear. *Chemical Engineering and Mining Review*, v. 50, Feb. 15, 1958, p. 40-46. 46 ref. (C-general; Li)

**214-C.\* Simultaneous Distillation of Ammonia and Separation of Copper From Nickel-Bearing Solutions.** V. N. Mackiewicz, R. L. Benoit, R. J. Loree and N. Yoshida. *Chemical Engineering Progress*, v. 54, Mar. 1958, p. 79-85.

Various stages in the development of a process for the simultaneous distillation of ammonia and the separation of Cu from Ni, starting from laboratory work to pilot plant, and eventually to the design and operation of the commercial units. 8 ref. (C22; Cu, Ni)

**215-C. Electrolysis of Ferrous Chloride Solutions With Special Reference to Extraction of Metals and Sulphur From Sulphide Ores.** V. Aravamudan. *Electrochemical Society, India Section, Bulletin*, v. 6, July 1957, p. 49-50, 62. (C23n)

**216-C. Electrons and Ions . . . Keys to Mineral Processing.** James W. Franklin. *Engineering and Mining Journal*, v. 159, Apr. 1958, p. 85-87. (C19s)

**217-C.\* Production of Hafnium.** Pt. 2. H. P. Holmes, M. M. Barr and H. L. Gilbert. *Industrial Heating*, v. 25, June 1958, p. 1114-1126.

Commercial-grade zirconium tetrachloride is treated and purified

to remove hafnium hydroxide which is dried and calcined to hafnium oxide. Direct chlorination of the hafnium oxide briquets is done in a vertical shaft, pilot-model chlorinator, with three graphite plates embedded in the lining serving as electrodes. Condenser is a cyclone type. (To be continued.) (C28, C19r; Hf)

**218-C.\* Chemical Processing of Nuclear Fuels.** C. M. Nicholls and R. Spence. *Institution of Chemical Engineers, Transactions*, v. 35, 1957, p. 380-393.

Concluded that there will be a need for versatility in processing plants some time to come since neither reactors nor fuel elements have become standardized. For this reason solvent extraction processes will be favored during the next few years. 6 ref. (C19, A11d, T11g; U)

**219-C.\* The Use of Electromagnetic Stirring in Zone Refining.** J. B. Mullin and K. F. Hulme. *Journal of Electronics and Control*, v. 4, Feb. 1958, p. 170-174.

Optimum removal of an impurity during zone refining may be achieved even at high rates of traverse by the use of stirring in the molten zone produced by a magnetic field rotating at 400 cycles per sec. 9 ref. (C28k)

**220-C. Mineral Processing by Chemical Methods.** *Mine and Quarry Engineering*, v. 24, Apr. 1958, p. 158-163. Aspects of the uranium milling industry. (C19; U)

**221-C. New Rip Process, Solvent Extraction, Lower Concentrate Price Feature  $\text{U}_3\text{O}_8$ .** H. L. Hazen. *Mining World*, v. 20, Apr. 15, 1958, p. 47-48.

Recovers dissolved U from acid slime pulp by adsorption on anion exchange resin beads. (C19s, A11d; U)

**222-C. Uranium Ore Reduction—the French Process.** Maurice Moyal. *Nuclear Power*, v. 3, Mar. 1958, p. 125-127. (C19r; C26; U)

**223-C. Plutonium Recycling With Molten  $\text{UF}_4$ .** Archie G. Buyers. *Nucleonics*, v. 15, Nov. 1957, p. 100-103.

Plutonium transfer from spent to fresh uranium fuel by oxidation into molten  $\text{UF}_4$  and reduction of the fluoride mixture to U-Pu alloy has been successfully accomplished. 5 ref. (C28j, C19r; Pu, U)

**224-C.\* The Production of Plutonium.** S. A. Butt. *Pakistan Journal of Science*, v. 9, Nov. 1957, p. 266-272.

Processes involved in the extraction of natural uranium from uraninite, carnotite, pitch-blende, autunite and torbernite ores and the separation of plutonium from the spent fuel. 12 ref. (C-general; Pu)

**225-C. New Developments in the Operation of a Gold Reduction Works.** A. H. Mokken. *South African Institute of Metallurgy, Journal*, v. 58, Feb. 1958, p. 307-342.

At Van Dyk Consolidated Mines, Witwatersrand, South Africa. (C-general, Au)

**226-C. (English.) Study of the Metallurgy of Antimonial Ores Bearing Gold and Silver.** Pt. 2. Tatsuo Matsukawa and Toshiyuki Sakai. *Osaka University, Technology Reports*, v. 6, Oct. 1956, p. 323-327.

Effects of the concentration of KCN, CaO and other reagents on the cyanide extraction of Au and Ag. 7 ref. (C19p; Au, Ag)

227-C. (German.) Separation of Rare Earths in the Tuhomo-Genious Magnetic Field. Walter Noddack, Ida Noddack and Elisabeth Wicht. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie*, v. 62, no. 1, 1958, p. 77-85. (C28; EG-g)

228-C. (Book.) Recent Developments in Uranium Milling Technology. 1957. 105 p. Uranium Institute of America, Uranium Center Bldg., Grand Junction, Colo. \$5.

Transcript of Mill Technology Symposium, May 17, 1957, Denver, Colo. Papers abstracted separately. (C19; U)

## Iron and Steelmaking

280-D. Production of Self-Fluxing Sinter. J. S. McMahan. *Blast Furnace and Steel Plant*, v. 46, May 1958, p. 497-498.

Operating characteristics and production of blast furnace with burden consisting of calcite or dolomite sinter. (Concluded.) (D1a, D1b; RM-n)

281-D. Rotary Kiln Enters Iron-Ore-Reduction Race. C. S. Cronan. *Chemical Engineering*, v. 65, May 5, 1958, p. 52-54.

R-N kiln reduces ore having at least 25% iron to metal. New-type control holds reducing gases at uniform heat. Shell inlet parts feed air into kiln to burn gases as they flow through. (D10c, Fe)

282-D. Openhearth Operation With High Firing Rates. Keith Moore. *Industrial Heating*, v. 25, May 1958, p. 968, 970, 972. (D2h)

283-D. Bottom Practice at No. 1 Openhearth. R. M. Jordan. *Industrial Heating*, v. 25, May 1958, p. 1005-1006, 1008, 1010, 1012, 1014.

The flat at a tap hole is the area of greatest bottom trouble incidence. (D7, 1-52)

284-D. Use of Sinter in the Blast Furnaces of the USSR. G. J. Adariukov. *Iron and Coal Trades Review*, v. 176, Apr. 18, 1958, p. 931-932. (D1a)

285-D. Twenty Years of Steelmaking. R. C. Baker. *Iron and Steel*, v. 31, May 1958, p. 186-192.

Experiences, operational problems, layout, control and practice in British openhearth plant. (D2, W18r, 18-67)

286-D.\* Oxygen and the Steel Plant: Summary of Operating Results. J. H. Strassburger. *Iron and Steel Engineer*, v. 35, May 1958, p. 69-71.

Growth of oxygen usage in steel plants in past decade; approximate quantities of oxygen used in openhearth, bessemer converters, top-blown oxygen converters, hot scarfing machines and blast furnaces per unit of production. Oxygen enrichment of blast, high blast heat, increased moisture in blast and improved burden have resulted in increased productivity of National Steel Corp.'s blast furnaces. Minimum of maintenance has been required for oxygen-producing equipment in company's plants. (D-general; ST, O)

287-D.\* Oxygen and the Steel Plant: Benefits of Purchased O<sub>2</sub> to the Indiana Harbor Works of the Inland Steel Co. N. R. Kirkdoffer. *Iron and*

*Steel Engineer*, v. 35, May 1958, p. 71-76.

History of oxygen usage at Indiana Harbor Works; oxygen facilities; reasons for selection of pipeline method of supply. Use of oxygen has enabled Inland to improve product quality, increase productivity of openhearth furnaces and reduce manhour requirements for surface conditioning, scrap preparation and maintenance activities. (D2g; ST, O)

288-D.\* Oxygen and the Steel Plant: Economics of Generated Vs. Purchased O<sub>2</sub> for Steel Plant Use. R. A. Lambert. *Iron and Steel Engineer*, v. 35, May 1958, p. 76-81.

Oxygen (100% high-purity) for normal plant uses is generated on site at Pittsburgh Works of Jones & Laughlin Steel Corp. Description of plant, storage facilities, distribution system; consumption in various departments; operating costs. (D-general, W10; ST, O)

289-D.\* Oxygen and the Steel Plant: Operation and Maintenance of a 100-Ton Double-Cycle Gaseous O<sub>2</sub> Plant. G. T. Wright. *Iron and Steel Engineer*, v. 35, May 1958, p. 81-84.

In 1954, Dominion Foundries & Steel, Ltd., in Hamilton, Canada, installed first oxygen steelmaking equipment on North American Continent. Two oxygen plants, one of which is described here, supply oxygen for steel melt shop and miscellaneous uses. (D10, W10; ST)

290-D.\* Oxygen and the Steel Plant: Oxygen Plant Cycles Tailored to Requirements of Iron and Steel Producers. Clarence J. Schilling. *Iron and Steel Engineer*, v. 35, May 1958, p. 86-94.

Low, medium, high and mixed-pressure cycles for on-site generation of liquid or gaseous oxygen and nitrogen by-product. (D-general, B25, 1-52; ST)

291-D. Designing a Large Tonnage Continuous Casting Plant. H. E. Skelley and Rufus Easton. *Iron and Steel Engineer*, v. 35, May 1958, p. 131-142.

11 ref. (D9q, 2-52, W10; ST)

292-D. Vacuum Steel Grows Up. J. H. Stoll. *Product Engineering*, v. 29, May 1958, p. 70-71.

Vacuum pouring insures against flakes, reduces nonmetallics and gives higher ductility. The operation may be watched by two television cameras, one focused on the stream of molten metal and the other one looking directly into the mold. (D9p, 1-73, X15p)

293-D. (German.) Influence of Alumina and Magnesium Oxide on Desulfurization of Pig Iron Melts With Lime-Silica Slag Under Reducing Conditions. Willy Oelsen, Eberhard Schürmann and Salah Osman. *Archiv für das Eisenhüttenwesen*, v. 29, Apr. 1958, p. 205-218.

Mechanism of desulfurization, experimental technique, effect of alumina, influence of magnesium oxide on desulfurization and its effect in the presence of alumina. Effect of addition of both on sulphur content of pig iron and on silicon reduction. Their significance in the determination of the basicity of the slag. (D11n; CI-a, RM-q)

294-D. (German.) Conditions of Smelting Pure Iron. Ludwig von Bogdandy, Rudolf Schmolke and Gerhard Winzer. *Archiv für das Eisenhüttenwesen*, v. 29, Apr. 1958, p. 231-234.

Investigation on oxygen emission

by crucible materials—aluminum, calcium, magnesium, zirconium oxides and dolomite measuring surface stress of molten pure iron in pressed specimens of these materials. Comparison of results with those obtained by thermodynamic calculation. (D11r, P12; Fe-a)

295-D. (Russian.) More Effective Method for Control of Carbon Content of Iron. L. I. Slepshova. *Stal'*, v. 18, Apr. 1958, p. 298-300. 10 ref. (D2, D11s)

296-D. Survey of Modern Blast-Furnace Techniques. T. P. Colclough. *Iron and Steel Institute, Journal*, v. 189, June 1958, p. 113-124. (D1)

297-D. Continuous Casting at the B.I.S.R.A. Experimental Plant. G. Fenton and J. Pearson. *Iron and Steel Institute, Journal*, v. 189, June 1958, p. 160-167. (D9q)

298-D.\* Weather Influences Hydrogen in Steel. T. W. Merrill. *Metal Progress*, v. 73, June 1958, p. 153-154, 158. (From *Vancoram Review*, v. 12, no. 2, Fall 1957, p. 14-15.)

Results of experiments indicate that weather, specifically moisture content of the air, is the most important factor in determining rate of hydrogen absorption in molten steel. (D11h; ST, H)

299-D.\* Manufacture of Leaded Steel. W. D. Smith. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 12-22.

Special equipment, close metallurgical control during and after the addition of the lead and careful inspection permit production of a highly satisfactory ingot. 5 ref. (D2, D8; ST, Pb)

300-D. Open Hearth Operation With High Firing Rates. A. K. Moore. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 26-31.

Summary of steps taken to increase furnace capacity from 16,000 to 23,000 tons per month by increasing fuel capacity, forced air capacity and other measures. (D2a)

301-D.\* Factors Affecting Heat Time. Thomas A. Cleary, Jr. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 32-38.

Effects of such variables as frequency of checker washing, furnace age and scrap change time on heat time. Equations indicating relationship of heat time to campaign life, and of heat life to time from start of charge to hot metal. (D2)

302-D. Effects of Improved Combustion Conditions in a Small Cold-Metal Shop. Gene M. Hagenberger. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 40-48.

Furnace production increased by increasing air volume, higher furnace pressure and accurate combustion control. Significant decreases in fuel requirements per ton were realized with no decrease in furnace life. (D2a, D2h)

303-D.\* European Methods of Acid Steelmaking. P. Herasymenko. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 49-65.

Steel with high manganese content in the charge can be refined without additions of ore and finished without addition of deoxidizers. Theory of hydrogen distribution between slag and metal. Lowering of hydrogen content possible by casting hollow ingots. 16 ref. (D2, 1-64, D11n)

- 304-D.\* Analysis of Molten-Steel Flow Rates Through Refractory Nozzles.** Carter H. Martin and Harold L. Taylor. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 84-97.  
Study of ladle nozzle erosion as steel is poured through either magnesite or clay nozzles. Erosion is directly proportional to time; therefore weight-flow rates can be computed as a function of pouring time. (D9p; RM-h)
- 305-D. Effect of Banding and Oil Impregnation of Nozzles on Pouring Performance.** A. Sontz and R. N. Ames. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 147-157.  
Effects of nozzle cracking are minimized by using bands, but no significant improvement results from impregnation with various carbonaceous materials. 8 ref. (D9p, W18r; RM-h)
- 306-D. An Evaluation of Cast Refractory Hot-Top Linings.** R. J. Tatousek and A. T. Peters. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 158-166.  
Although the life of cast linings was greater than that of brick linings, excessive erosion during the extended life of the cast linings caused hot-top metal losses that were prohibitive. A brick-lined hot top, reduced in volume, compared favorably with regular hot tops. (D9k, W19c)
- 307-D. The All-Basic Furnace.** J. E. Harrod. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 167-175.  
Report on operation of U. S. Steel furnace from 1947 to 1956. (D2, W18r; 1-65)
- 308-D. Quality Considerations in Cold-Metal Charging.** Russell H. Farr. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 208-216.  
(D2a, 17-4)
- 309-D. Alloy Steel Production in a Cold-Metal Shop.** A. H. Stewart. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 216-219.  
(D2; AY-b, SS-b)
- 310-D. New Trends in Firing Practices for Open Hearth Furnaces.** J. E. Goodin. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 236-241.  
High-pressure gas as an atomizing agent can be used efficiently to replace steam. The current prices of natural gas and fuel oil also make a high-pressure gas for atomization economically attractive. (D2h, W18r)
- 311-D. Contribution of Bath Temperature Control to Improved Open Hearth Production Rates.** W. J. Flynn. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 245-252.  
(D2, S16a)
- 312-D. Influence of Open Hearth Combustion Practice on Rates of Heat Transfer as Determined by Use of the Hot-Model Technique.** J. H. Richards. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 253-266.  
(D2h, P11k, 17-56)
- 313-D. Design and Operation of Open Hearth Furnaces in Australia in 1957.** R. L. Knight. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 266-280.  
(D2, W18r)
- 314-D. The Physical Chemistry of Steelmaking—a Tribute to Dr. C. H. Herty, Jr.** G. R. Fitterer. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 281-303.  
Historical review. 40 ref. (D11, A2)
- 315-D. Current Concepts of Open Hearth Slag Control.** M. W. Lightner. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 304-314.  
20 ref. (D2d)
- 316-D. Research - Foundation of Steel's Progress Today.** James B. Austin. *Franklin Institute, Journal*, v. 265, May 1958, p. 385-394.  
First William B. Coleman lecture delivered at the Annual Meeting of the Franklin Institute, Jan. 15, 1958. (D-general, A9; ST)
- 317-D. U. S. Steel Puts Oxygen Analyzer Into Closed-Loop Combustion Control.** E. W. Hunziker and J. W. Bain. *I.S.A. Journal*, v. 5, May 1958, p. 32-36.  
In the Geneva Works openhearth department, Provo, Utah. (D2h, S11r, 1-53)
- 318-D. Instrumentation for Iron and Steel.** *Metal Treatment and Drop Forging*, v. 25, May 1958, p. 181-186.  
Openhearth furnace control, bessemer instrumentation, strip measurement and inspection; future developments. (D-general, S18; ST)
- 319-D. Refractories for the New Steelmaking Processes.** J. H. Chesters. *Refractories Journal*, no. 4, Apr. 1958, p. 145-167, 170, 174.  
Challenge presented by the new oxygen techniques. 27 ref. (D-general, D10, RM-h)
- 320-D. Europe Expands Steel-Making Capacity.** D. L. McBride. *SAE Journal*, v. 66, June 1958, p. 62-63.  
Review of significant European developments including the Kaldor process, the Oberhausen rotary furnace and direct reduction methods. (D10, D8j, D8n; ST)
- 321-D.\* (Russian.) Problem of Sulphide Inclusions in Molten Steels.** D. K. Butakov. *Fizika Metallov i Metallovedenie*, v. 5 no. 1, 1957, p. 155-160.  
Development of sulphides is connected with the process of solidification. This may be observed by Bauman's test which produces impression of dendritic crystals. In nonmanganese steels sulphides crystallize at 988° C. In Mn and other alloy steels inclusions develop at higher temperatures depending on sulphur content and on its correlation with Fe, Mn, Al and Si which may enter into their composition. 14 ref. (D11s, N12; ST, 9-69)
- 322-D.\* (Russian.) Blowing of Reducing Gases Into Blast Furnace Hearth.** M. A. Shapovalov. *Stal'*, v. 18, May 1958, p. 385-390.  
Factors influencing coke consumption; efficiency of natural gas and coke-oven gas; optimal point of application of gas blast; suitable composition of gas; calculation of thermal balance and carbon consumption; economics of reducing gas blast. 7 ref. (D1h, D11g, D11k)
- 323-D.\* (Russian.) Higher Efficiency of Blast Furnace Reached by Changing Blast Composition.** E. M. Lokshin and Yu. S. Borisov. *Stal'*, v. 18, May 1958, p. 391-397.  
Effect of various factors on efficiency of blast furnace; calculation of raw materials; calculation of zonal thermal balances; calculation of burning process in tuyere zone; calculation of direct reduction; determination of smelting indices; various types of combined blast. 9 ref. (D1h, D11k)
- 324-D.\* (Russian.) Dependence of Coke Consumption and Productivity of Blast Furnace Upon Sinter Basicity.** I. B. Strashnikov, A. G. Astakhov, G. V. Ksendzyk, I. V. Fedorovsky and K. A. Shumilov. *Stal'*, v. 18, May 1958, p. 398-402.  
Dependence of coke consumption, ratio of ore to coke and smelting intensity upon sinter basicity. Factors interfering with smelting intensity. Method of evaluating sinter quality. (D1, D11)
- 325-D.\* (Russian.) Gas Absorption by Bessemer Steel Melted With Oxygen Blast.** S. G. Afanasyev and M. M. Shumov. *Stal'*, v. 18, May 1958, p. 405-410.  
Mechanism of nitrogen absorption. Factors influencing nitrogen content of steel. Oxygen equilibrium in bessemer process. Production of high-quality bessemer steel by bottom-blown and top-blown methods. 5 ref. (D3f, D11h)
- 326-D.\* Vacuum Pouring of Ingots for Heavy Forgings.** J. H. Stoll. *Blast Furnace and Steel Plant*, v. 46, June 1958, p. 595-605.  
Vacuum pouring cuts down on hydrogen content and prevents flaking. One 7-ton and two 250-ton vacuum degassing units, composed of a mold within a sealed chamber, were tested. Hydrogen content averaged 0.5 ppm. against 1.5 ppm. in air-cast material. Ductility and cleanliness were superior. Initial and operating costs are higher and hazards greater. (D8m, D9s; ST)
- 327-D. Ironmaking—Art or Science?** Harold A. Goldfein. *Blast Furnace and Steel Plant*, v. 46, June 1958, p. 611-614.  
Operation of blast furnaces; quality of coke and limestone; handling of ore from unloading to furnace; temperature, humidity, pressure in operation of furnace; quality of slag. (D1)
- 328-D. Continuous Casting of Steel.** *Engineering*, v. 185, Mar. 7, 1958, p. 293-294.  
German practice at Demag, A.G., Duisburg. (D9q; ST)
- 329-D. Reaction Between Silica and Carbon and the Activity of Silica in Slag Solution.** J. D. Baird and J. Taylor. *Faraday Society, Transactions*, v. 54, Apr. 1958, p. 26-539.  
21 ref. (D11; Si, C, RM-q)
- 330-D. Increasing Blast-Furnace Smelting Rates.** R. Sewell. *Iron and Coal Trades Review*, v. 175, Nov. 8, 1957, p. 1075-1077. (From *Metallurgy*, Aug. 1957.)  
(D1)
- 331-D. The 49th BISRA Steelmaking Conference.** *Iron and Coal Trades Review*, v. 176, Mar. 7, 1958, p. 561-567.  
Held by the British Iron and Steel Research Association, at Harrogate, Nov. 6-7, 1957. Discussions cover the use of oxygen. (D10, D2g, D3f)
- 332-D. The Study of Slag-Metal Mixing Efficiency by Models.** C. E. A. Shanahan and F. Cooke. *Journal of Applied Chemistry*, v. 7, Dec. 1957, p. 645-654.  
Relative efficiencies of various methods of mixing liquid slag and metal studied by means of cold models. Using sodium amalgam as

"metal" and dilute sulphuric acid as "slag" it is shown that a most efficient method of mixing consists of pouring the metal into the slag and that the degree of mixing is dependent on both the drop height and the rate of pouring. 7 ref. (D11n)

**333-D.** Oxygen in Steelmaking. J. A. Charles. *Research Applied in Industry*, v. 9, Mar. 1958, p. 102-107.

Main oxygen applications within the industry and progress achieved; a period of concentrated attention to the design of special furnaces and equipment predicted. (D10, D2g, D3f)

**334-D.** Successful Culmination of British Experimentation in Continuous Casting of Steel. *Wire Production*, v. 6, Dec. 1957, p. 14-15.

British production at the Low Moor Alloy Steelworks Ltd. and at the Barrow Steel Co. (D9q)

**335-D.** (Greek.) Electric Smelting of Iron Ore. K. Sandvold, F. S. Collin and J. Gundersen. *Xnyika Kpovika*, v. 23, Feb-Mar. 1958, p. 46-50.

Development of iron smelting in electrical furnaces in Norway and elsewhere. 7 ref. (D8n; Fe)

**336-D.** (Rumanian.) Desulphurizing Power of Blast Furnace Slags. Pt. 7. Sulphur Absorption Capacity of Slags of the System  $\text{SiO}_2\text{-CaO-BaO}$  in the Liquid State at  $1500^\circ\text{C}$ . Traian T. Negrescu. *Studii si Cercetari de Metalurgie*, v. 2, no. 4, 1957, p. 447-463. 6 ref. (D11n; S)

**337-D.** (Russian.) Technical and Economic Advantages of Using Steam-Air in Blast Furnaces. V. Ya. Miller and S. A. Elkin. *Stal'*, v. 18, Mar. 1958, p. 193-202.

Quantitative relations between the moisture content of the blast and the reducing power of the blast gases established by new method for investigating the diffusion reduction rate of iron oxides. This made it possible to determine the minimum rise of the blast temperature on which the technical and economical advantages of using steam air blast in blast furnaces depends. 4 ref. (D1h, D11r)

**338-D.** (Russian.) Production of Steel From Low-Manganese Pig Iron. P. G. Glazkov, A. M. Ofengenden, I. I. Druzhinin, R. P. Nesterovich and G. T. Chepurnoi. *Stal'*, v. 18, Mar. 1958, p. 209-213.

Production of steel from pig iron of acceptable sulphur content is possible under the conditions prevailing in the southern part of the USSR. Efficiency may be improved by using coke oven gases, freed from sulphur for firing openhearth furnaces. 9 ref. (D2; D11s; KM-m38)

**339-D.** (Russian.) Deoxidation of Killed Steel in the Ladle by Ferro-Aluminum. I. N. Ladvanov. *Stal'*, v. 18, Mar. 1958, p. 218-223.

Use of ferro-aluminum alloy addition instead of adding Al to the metal during tapping results in a saving in Al and improvement in steel quality. 6 ref. (D9r; Fe, Al, AD-n)

**340-D.** (Russian.) Temperature of the Combustion Products at the Outlet of a Tilting Open-Hearth Furnace. G. M. Glinkov, E. A. Kapustin and V. A. Makovsky. *Stal'*, v. 18, Mar. 1958, p. 223-224. (D2h)

**341-D.** (Russian.) Production of Transformer Steel by Mixing Openhearth and Electric Steels. G. Vozny.

*Stal'*, v. 18, Mar. 1958, p. 225-226. 5 ref. (D7a; ST, SGA-n, Si)

**342-D.\*** (Russian.) Desulphurization of Steel in the Ladle. A. S. Tochinsky and N. V. Popova. *Stal'*, v. 18, Mar. 1958, p. 214-218.

Sulphur content of steel may be reduced by 35-45% without substantial rise in the price of the metal and with certain improvement in quality by treating the acid or basic metal with white or alumina-containing slags in the ladle during tapping. (Dgm, D11n; ST, g)

**343-D.** (Book.) Proceedings of the 40th Conference: National Openhearth Steel Committee of the Iron and Steel Division. 340 p. v. 40, 1958. The Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers, 29 W. 39th St., New York 18, N. Y.

The 1957 convention papers, covering basic and acid operations, operating metallurgy, refractories and masonry, cold metal and basic foundry practice, operating and combustion and physical chemistry. Papers separately abstracted. (D-general)

## Foundry

**457-E.** Cavity Proportions Upon Metal Flow. *Australasian Manufacturer*, v. 42, Oct. 5, 1957, p. 44-50, 67, 68.

Control of metal flow in die casting by correct choice of the sprue, runner and gate and varying orientation of cavity in respect to the gate. (E13, E22)

**458-E.** Vacuum Die Casting Processes. *Australasian Manufacturer*, v. 42, Oct. 19, 1957, p. 70-79. (E13, 1-73)

**459-E.** Some Aspects of Mold-Making. A. E. Peace. *British Foundryman*, v. 51, May 1958, p. 239-241.

Presidential address given before the Institute of British Foundrymen. 9 ref. (E19)

**460-E.\*** Mold and Core Production by the  $\text{CO}_2$  Process at the Blakeborough Foundries. T. C. Wilson and J. B. Hollis. *British Foundryman*, v. 51, May 1958, p. 241-250.

Sand mixes, effects of various additives, blacking methods, gassing equipment and methods; application to various types of molds and cores, examples; analyses of labor and material costs. (E19, E21, E18)

**461-E.\*** Inverse Chill in Grey Cast Iron. G. T. Brown and R. T. Allsop. *British Foundryman*, v. 51, May 1958, p. 251-256.

Inverse chill showed the features of acicular carbide and undercooled-type graphite which have been previously reported. Inverse chill is produced by the interaction of a number of factors. In the present case the high sulphur:manganese ratio is considered to be primarily responsible for the stabilization of white iron. 15 ref. (E25n; CI-n)

**462-E.\*** The Production of the British Motor Corporation Series "C" Cylinder-Head Casting. L. W. Bolton. *British Foundryman*, v. 51, May 1958, p. 257-265.

Molding and core-making; examination and gaging of cores. The metal is cupola melted; tests used to control its properties; special

gaging and checking operations. (E11; CI)

**463-E.** Improvement and Probable Trends in Non-Ferrous Melting and Casting. James R. Hunt. *Castings*, v. 4, Mar. 1958, p. 5-19. (To be continued.) 19 ref. (E10, W18, C5; EG-a38)

**464-E.** The Foundry Industry in Finland. *Castings*, v. 4, Mar. 1958, p. 19-23.

(E-general)

**465-E.** Recent Developments in the Manufacture of Castings. J. L. Rice, R. W. Ruddle and P. A. Russell. *Chartered Mechanical Engineer*, v. 4, Nov. 1957, p. 444-446.

Developments during last decade in foundry practice; shell molding,  $\text{CO}_2$  process, Shaw process, nodular cast iron, new casting alloys. (E-general)

**466-E.** Light Alloys for Casting Tricky Shapes. *Design Engineering*, v. 4, May 1958, p. 58-59.

Trade-named Tens-50 new Al alloy can be cast with minimum rejection rates by sand or permanent mold methods. (E11, E12; Al-b)

**467-E.\*** Riser of Steel Castings With Exothermic Sleeves. H. F. Bishop, H. F. Taylor and R. G. Powell. *Foundry*, v. 86, June 1958, p. 54-59.

Use of exothermic sleeves in risers permits reduction in riser diameter and volume as well as a longer solidification time for molten steel. (E22q; ST)

**468-E.\*** Die Castings in Ammunition Design. L. G. Klinker, Morris A. Gardepe and Robert H. Ridgway. *Foundry*, v. 86, June 1958, p. 60-61.

Small ammunition parts fabricated by Zn die casting, Al die casting or permanent mold casting of iron. (E13, E12, T2j; Al, CI, Zn, Fe)

**469-E.** Foundry Modernization. Pt. 3. Robert H. Herrmann. *Foundry*, v. 86, June 1958, p. 62-64.

General Electric Co. facility for permanent mold production of gray cast iron; cupola, pattern shop, quality control. (E12, W18c, W19j)

**470-E.** Institute of Metals Jubilee Meeting. Works Visits: J. Stone and Co. (Charlton) Ltd. R. J. M. Payne. *Metal Industry*, v. 92, May 16, 1958, p. 403-405. (E-general, 1-52; Al, Mg, 5-60, 18-67)

**471-E.** Idea Tour of European Foundries. C. A. Sanders. *Modern Castings*, v. 33, June 1958, p. 38-41.

Summary of developments in general foundry practice, sand handling, automation,  $\text{CO}_2$  molding and pattern design. (E-general)

**472-E.\*** Rigging Design of High Strength Magnesium Alloy Castings. Merton C. Flemings, Richard W. Strachan, Ernest J. Poirier and Howard F. Taylor. *Modern Castings*, v. 33, June 1958, p. 45-50.

Production of two high-quality Mg alloy sand castings. One casting was composed of relatively heavy sections ( $\frac{1}{2}$  to 2 in. thick) and the other of thin sections ( $\frac{1}{10}$  to  $\frac{1}{2}$  in. thick). Chilling substantially improved the properties of the heavy section casting in both AZ91C and AZ92A alloys. Chilling had little effect on the mechanical properties of the thin section casting. (E22r; Mg-b)

**473-E.** Sintered Alumina Molds for Investment Casting of Steels. F. C. Quigley and B. Bovarnick. *Modern Castings*, v. 33, June 1958, p. 51-55.

Investment casting molds made by coating wax pattern with slurry and aluminum oxide produce good castings in less time with reduced costs. (E15, W19g)

**474-E. Carbon Dioxide Cores in a Malleable Foundry.** George Nestor. *Modern Castings*, v. 33, June 1958, p. 56-60. (E21g)

**475-E. Problems Encountered in Casting Reactive Metals.** W. A. Aschoff and D. H. Blair. *Modern Castings*, v. 33, June 1958, p. 61-64.

High cost, difficulty of temperature control, lack of suitable mold materials are factors to be overcome before castings of this type are feasible on a large scale. (E-general; Zr, Ti)

**476-E.\* The Problem of Hot Molding Sands.** R. W. Heine, E. H. King and J. S. Schumacher. *Modern Castings*, v. 33, June 1958, p. 65-71.

Sands must be cooled to 160-170° F. before effective mulling can begin. Other problems such as moisture condensation, sticking sand, become less severe as it is cooled to 120° F. or lower. (E18)

**477-E. Steel Scrap Specifications for Duplexing Cupola White Iron.** R. H. Greenlee. *Modern Castings*, v. 33, June 1958, p. 72-74.

Careful control of scrap purchased, to eliminate undesirable alloys and other unsatisfactory conditions, results in marked savings in material and cost. (E10a, RM-p, ST, CI-p)

**478-E.\* The Chemical Treatment of Copper Alloys.** R. W. Ruddle. *Modern Castings*, v. 33, June 1958, p. 75-81.

Review of chemical methods of treating alloys to reduce melting losses, prevent dross formation, remove gases, or produce desired grain structure. 17 ref. (E25; Cu, Sn, Pb, Zn)

**479-E. Sieve Ratios and Processing for Strong Molding Sands.** J. Parisi, O. C. Nutter and C. Michalowski. *Modern Castings*, v. 33, June 1958, p. 82-87.

Analyses of grain sizes and packing characteristics, tempering and mulling variables. Recommendations for optimum results. (E18)

**480-E.\* The Effect of Some Gases on the Work of Adhesion Between a Novolak and Quartz.** Dennis W. G. White and Howard F. Taylor. *Modern Castings*, v. 33, June 1958, p. 92-98.

A quantitative study of the individual effect of nitrogen, oxygen, water vapor and ammonia on the bond strength between phenolformaldehyde resin and a refractory metal oxide. These experiments lead to conclusions regarding the bond between the resin and metal oxide of a shell mold. 11 ref. (E19c, E18n)

**481-E.\* Industrial Applications of Olivine Aggregate.** Gilbert S. Schaller and W. A. Snyder. *Modern Castings*, v. 33, June 1958, p. 99-104.

Compared to silica, olivine offers slightly greater cooling effect, increased heat capacity, uniform thermal expansion, resistance to fracture by thermal shock. It is replacing conventional materials in several specific applications. (E18r)

**482-E.\* On the Release of Hydrogen From Molten Aluminum.** Asutosh Pal and H. M. Davis. *Modern Castings*, v. 33, June 1958, p. 105-108.

A significant portion of the hydro-

gen in molten Al can be removed by treatment with briquettes containing magnesium oxychloride weighted with corundum. The decomposition products of the briquettes make no objectionable addition to the Al. 6 ref. (E25s; Al, H)

**483-E. Permanent Mold Casting With New Magnesium Alloy.** Frank Gaines. *Western Metalworking*, v. 16, May 1958, p. 48-49. (E12; Mg-b, Th, Zr)

**484-E.\* (French.) Employment of Gases in the Foundry and in Metallurgy.** Albert Portevin. *Fonderie*, v. 147, Apr. 1958, p. 153-156.

Employment of gases in metallurgy from the physico-chemical and the chronological viewpoints. In the former there is the effect of the gases on the quality of the casting; in the latter the role of the gases is considered in melting, pouring and solidification. (E-general; EG-m44)

**485-E. (French.) Graphitization of Castings by Gas Inoculation.** Georges Blanc and Nicolas Voliank. *Fonderie*, v. 147, Apr. 1957, p. 157-173.

Nitrogen gas is bubbled through a casting bath by a graphite tube. Machinability of thin gray iron castings is improved by avoiding the formation of hard zones due to the presence of cementite. Other advantages are elimination of inclusions and stability of the graphite. 38 ref. (E25n, G17k; CI-n)

**486-E. (French.) Some Metallurgical Phenomena in the Cupola Furnace.** Francois Danis. *Fonderie*, v. 147, Apr. 1958, p. 179-182.

Summary discussion based on previously conducted studies of the influence of the quantity of air in casting analysis and carburization phenomena. (E10a; CI)

**487-E.\* (French.) Impregnating Porous Pieces for Water Tightness.** *Fonderie*, v. 147, Apr. 1958, p. 183-191.

Effectiveness of various impregnating products available on the French market for rendering castings water-tight under pressure. Casting specimens were light alloy and bronze disks. (E25, EG-a39, Cu-s)

**488-E. (German.) Determination of Bath Volume in Melting Titanium in Arc Furnace.** Alexej Nowikow and Robert Brenner. *Zeitschrift für Metallkunde*, v. 49, Apr. 1958, p. 199-201.

Method to calculate depth of the bath on the basis of distribution of an extraneous metal. Experimental technique using manganese. Calculation of bath depth by the method of the smallest squares. (E10r; Ti)

**489-E. (Italian.) Die Casting.** Roberto Allara. *Rivista di Meccanica*, v. 9, Mar. 1, 1958, p. 17-31. (E13)

**490-E. (Italian.) Technique and Applications of Investment Casting.** Oscar Gherbaz. *Rivista di Meccanica*, v. 9, Mar. 1, 1958, p. 47-52. 4 ref. (E15)

**491-E.\* (Japanese.) Mechanism of Hot Tearing in Steel Casting. Pt. 1. Results of Observing Hot Tear Fractures and Metallographic Structures Around Hot Tears.** Susumu Oki. *Japan Foundrymen's Society, Journal*, v. 30, Feb. 1958, p. 83-88.

Hot tear fractures and metallographic structures around hot tears in sand cast carbon steel castings containing 0.20 to 0.25% carbon and having wall thickness of 10 to 50 mm. Almost all the hot tears showed

indications that they grew between dendrites of primary crystals. In a few cases, hot tearing occurs on boundaries of primary austenite grains after complete solidification. This kind of hot tear can easily be distinguished from interdendritic ones. 6 ref. (E25n, 9-72; ST)

**492-E. (Japanese.) Cupola Studies. Pt. 3. Notes on Blast Flow.** Toru Ishino. *Japan Foundrymen's Society, Journal*, v. 30, Feb. 1958, p. 95-103. (E10a, W18d)

**493-E.\* (Japanese.) Packing Properties of Molding Sand.** Jiro Kashima and Kazuya Miyazaki. *Japan Foundrymen's Society, Journal*, v. 30, Feb. 1958, p. 104-107.

Relationship between packing properties and grain size distribution of a molding sand, where the degree of ramming is constant. Maximum packing property was obtained when the mixing ratio in weight of coarse and fine grain size of uniform sands was 4:6. Packing properties of sands are also influenced by the choice of binders. 5 ref. (E18r)

**494-E.\* (Japanese.) Study on Sand Adhesion to Castings. Pt. 1. Velocity of Liquid Metal Penetration in Sand Mold.** Toshiro Owadano and Hideo Mikashima. *Japan Foundrymen's Society, Journal*, v. 30, Feb. 1958, p. 108-113.

Velocity of metal penetration in sand mold investigated by attaching the sand specimen to the surface of molten Pb and Sn, which are kept at constant temperatures, and applying negative pressure to the specimen for penetration. The sand specimen is prepared by baking sieved silica sand mixed with linseed oil as a binder. Depth of metal penetration is related to the time of penetration. 10 ref. (E11; 1-54)

**495-E.\* (Japanese.) Some Studies on Cupolas. Pt. 4. Relation Between Air Flow and Chemical Reaction in the Cupola on Melting Conditions.** Toru Ishino. *Japan Foundrymen's Society, Journal*, v. 30, Mar. 1958, p. 144-152.

Melting rate, properties of melts, gas distribution and changes of blast pressure in the furnace. Effects of small and large tuyeres. (E10a)

**496-E.\* (Japanese.) Some Considerations on Cupola Operation by Mixing Tekken Briquette Coke.** Masao Sawada. *Japan Foundrymen's Society, Journal*, v. 30, Mar. 1958, p. 159-166.

No difference in the quality of molten iron can be observed when the low-sulphur coke and the Tekken briquette coke are mixed in a 50:50 ratio and used as split coke in the hot blast cupola. 8 ref. (E10a; RM-j43; CI)

**497-E.\* (Japanese.) Segregation in Castings. Pt. 7.** Kazuo Yasuda. *Japan Foundrymen's Society, Journal*, v. 30, Mar. 1958, p. 166-170.

Segregation in samples of 99.07% pure aluminum and Al-Cu alloy of 5.8% Cu were used for the preparation of samples solidified at different rates. 7 ref. (E25n, 9-69; Al, Cu)

**498-E. (Russian.) Defects Caused by Phosphorous Impurities in German Silver Alloys.** Z. Hegedus and M. Stefan. *Acta Technica*, v. 20, no. 3-4, 1958, p. 297-304.

Effect of phosphorus contamination on structure and technological properties of Cu-Ni alloys. (E25q, Q-general, 9-69; Cu, Ni, P)

- 499-E. (Russian.) Linear, Surface and Blowhole Shrinkage of Magnesium Cast Iron. K. I. Vashchenko, R. P. Todorov and V. V. Zhizhenko. *Liteinoe Proizvodstvo*, v. 2, Feb. 1958, p. 14-20.  
Study of the shrinkage of magnesium cast iron as a function of the chemical composition, in particular Mg and Si content, and the crystallization time factor. 16 ref. (E25n, P10c; CI-r)
- 500-E. (Russian.) Deoxidation of Lead Bronze Bearings With Powdered Material (70% Pb, 30% Cu). G. S. Pronyakov. *Vestnik Mashinostroeniya*, no. 2, Feb. 1958, p. 61-63. (E25s; Cu-s, Pb, AD-r)
- 501-E. A French Glossary for Foundrymen. Pt. 1. *British Cast Iron Research Association, Bulletin*, v. 14, May 1958, p. 353-361.  
Compilation by the abstracting staff of the British Cast Iron Research Association. (To be continued.) (E-general, 11-67)
- 502-E. Foundry Modernization. Pt. 3. Robert H. Herrmann. *Foundry*, v. 86, June 1958, p. 63-64.  
General Electric's permanent mold gray iron casting facilities, pattern shop and quality control operations. (E12, W19, 18-67; CI-n)
- 503-E. Automated Molding and Pouring. *Foundry*, v. 86, June 1958, p. 71-76. (E19, E23, 18-74)
- 504-E.\* Effects of Composition on Soundness and Properties in Some Foundry Bronzes. W. T. Pell-Walpole. *Foundry Trade Journal*, v. 104, June 5, 1958, p. 681-686.  
Critical pouring temperature for the rapid deterioration in density and mechanical properties which sand-cast bronzes and gun-metal suffer is directly related to the solidus of the alloy and is therefore very sensitive to its phosphorus content. A mold wash of 10% Al<sub>2</sub>O<sub>3</sub>, 10% plumbago in tar-oil, raises the critical temperature for reaction and thus extends the safe-range. (E25n, E22s; Cu-s)
- 505-E.\* High-Speed Diecasting Line Features Automatic Pouring. Herbert Chase. *Iron Age*, v. 181, June 12, 1958, p. 96-98.  
Die casting of aluminum turbo-torque converter transmission parts with automatic pouring. Holding furnaces automatically send a precise amount of molten Al to the diecasting unit. Dies weigh 17½ tons, are parted through the long axis of the casting. Large hydraulically actuated cores are pulled horizontally from each end of the casting. Radiant gas heaters keep dies hot during production lull. (E13, T21c; Al)
- 506-E. Vacuum Die Castings of Zinc Have Low Porosity, Good Surface, Thin Walls. John L. Everhart. *Materials in Design Engineering*, v. 47, June 1958, p. 110-112. (E13, 1-73; Zn)
- 507-E. Automated Foundry System Is Flexible. *Steel*, v. 142, June 16, 1958, p. 98-99. (E23, E19b, E25, 18-74; CI-s)
- 508-E.\* (French.) Modern Casting Methods. Pierre Prette. *Mecanique*, v. 42, Feb. 1958, p. 111-117.  
Lost wax, Croning and Shaw processes. Development of spheroidal (or ductile or nodular) cast irons and methods of manufacture. All French nodular irons are made with addition of Ni-Mg alloy, resulting in high Mg content. (E25, E15, E16c; CI)
- 509-E.\* (German.) Considerations on Theory of Shell Molding. A. Braybrook and B. H. C. Waters. *Giesserei*, v. 45, May 8, 1958, p. 263-277.  
Stability of sands used; hardness of the shell; influence of clay addition; gas permeability and gas content of the shell; closing the shell; gates and risers. Effect of shell on casting structure. Comparison between shell molding and other methods. (E16c, 10-51)
- 510-E. (German.) Sand Cooling in Mechanized Foundries. H. Grolman. *Giesserei-Praxis*, v. 76, Mar. 25, 1958, p. 99-100. (E18)
- 511-E. (German.) Use of HC Coke in Cupola Furnace. A. Hohmann. *Giesserei-Praxis*, v. 76, Mar. 25, 1958, p. 104-105. (E10a; RM-j43)
- 512-E. (German.) Wheel Made in Model Shaped Sand Mold. A. Ahrendt. *Giesserei-Praxis*, v. 76, Mar. 25, 1958, p. 106-109.  
Use of model from wood and wax substitutes for usual pattern lowers manufacturing costs for molding single piece of wheel. (E17)
- 513-E. (Russian.) How to Increase the Productivity of Foundry Shops in Gorki Region. N. I. Dutikov. *Liteinoe Proizvodstvo*, Apr. 1958, p. 1-2. (E-general)
- 514-E. (Russian.) Low-Silicon Casting and Pig Iron for High-Quality Castings. N. A. Barinov. *Liteinoe Proizvodstvo*, Apr. 1958, p. 7-10. (E11; Si, CI, CI-a)
- 515-E. (Russian.) Compacting of Core Mix by the Sandblowing Method. V. G. Rakogon. *Liteinoe Proizvodstvo*, Apr. 1958, p. 15-19. (E21)
- 516-E. (Russian.) Some Factors Affecting Hot Cracking in Steel Casting. A. M. Lyass and Chzhoi Yo-Kho. *Liteinoe Proizvodstvo*, Apr. 1958, p. 19-23. 10 ref. (E-general, 9-72; ST)
- 517-E. (Russian.) Pressure Control in Runner Systems. B. V. Rabinovich. *Liteinoe Proizvodstvo*, Apr. 1958, p. 26-28. 7 ref. (E22p, 3-74)
- 518-E.\* (Spanish.) Nodular Castings. Francisco Rodriguez Yufera. *Instituto del Hierro y del Acero*, v. 11, Jan-Mar. 1958, p. 1-23.  
Theories of nucleation and development of spheroidal graphite nodule in inoculated castings; possibility that this mechanism can be explained by Frank's theory of dislocations. It is assumed that nucleation arises directly from germ or submicroscopic impurity in suspension in liquid metal by supersaturated vapor of inoculating agent, begins to grow according to mechanism described by Frank and Read, with nodule developing inside austenite. 24 ref. (E25, N2; CI-r)
- 519-E. Permanent Molds: The Die-coat Must Be Right. V. H. Furlong. *Canadian Metalworking*, v. 21, May 1958, p. 24-26.  
Purposes, selection and application of die coat in permanent molding. (E12)
- 520-E. Improvement and Probable Trends in Non-Ferrous Melting and Casting. Pt. 2. James R. Hunt. *Castings*, v. 4, Apr. 1958, p. 5-21.  
Review of Al and Mg foundry practice. (E-general; Al, Mg)
- 521-E. New Thames Foundry, Ford Motor Co., Ltd. *Foundry Trade Journal*, v. 104, May 29, 1958, p. 627-663. (E-general, W10a, T21b)
- 522-E.\* Super-Strong Light-Alloy Castings. Merton C. Flemings and Howard F. Taylor. *Machine Design*, v. 30, June 12, 1958, p. 23-24.  
Production of superior castings by strict control over alloy analysis, melting variables, gating, molding, chilling, risering and heat treatment. 9 ref. (E25, E22, J-general; EG-a39)
- 523-E. Ferranti Die Castings for Electricity Meters. *Machinery*, v. 92, May 30, 1958, p. 1287-1291.  
A light alloy die-casting foundry for large-scale production of components of meters. (E13, T1; Al)
- 524-E. Pressure Die Casting of Zinc in the Necchi Foundry. *Machinery*, v. 92, May 30, 1958, p. 1292-1295. (E13; Zn)
- 525-E. Spheroidal Graphite Cast Iron Made by Calcium and Calcium Alloy Additions. Takaji Kusakawa. *Waseda University, School of Science and Engineering, Memoirs*, no. 21, 1957, p. 144-158. (E25q; CI-r)
- 526-E. Shell Molding. R. D. Winter. *Wisconsin Engineer*, Apr. 1958, p. 24-27, 58-59.  
Development and applications of semi-precision shell molding. (E19c)
- 527-E.\* (German.) Experimental Production of Binders for Shell Molding. Manfred Lottermoser. *Giesserei*, v. 45, May 22, 1958, p. 304-307.  
Croning method of shell production; properties of binders. Suitability of various synthetic thermosetting resins. Russian experiments with wood pitch. Experiments with pitch binder containing sulphur. (E19c; NM-f45)
- 528-E.\* (German.) Use of Pressed Board in Pattern Making. Fritz Härtling. *Giesserei*, v. 45, May 22, 1958, p. 311-313.  
General technical data; applications, machining and gluing, edge protection, assembling. (E17)
- 529-E.\* (German.) Pattern Designing as Regard to Requirements of Core-making and Molding. Heinrich Knoch. *Giesserei*, v. 45, May 22, 1958, p. 313-315.  
Construction of pattern; forming of core-prints; core-prints on plane parallel to separating line; core-prints for chaplets parallel to separating line. (E17, E21, 17-51)
- 530-E. Non-Ferrous Foundry Practice. G. C. S. Webster. *Engineer and Foundryman*, v. 22, Feb. 1958, p. 45-52.  
Production of Cu-base, Al and Ni alloys; molding and melting practice; some types of melting units; importance of gas-free metal for consistent results from separately cast test bars. (E10, 1-52, E19; Cu-b, Al-b, Ni-b)
- 531-E. The Foundry Industry in South Africa. H. J. Van Eck. *Engineer and Foundryman*, v. 22, Feb. 1958, p. 76-80. (E-general)
- 532-E. Metallurgical Progress in the Iron Foundry. W. W. Braidwood. *Engineer and Foundryman*, v. 22, Feb. 1958, p. 81-85, 92. 14 ref. (E-general; CI)
- 533-E. Dry Hearth Furnace Speeds Production of Aluminum Castings. F. L. Turk. *Industrial Heating*, v. 25, June 1958, p. 1138, 1140, 1142.  
Aluminum melted on sloping

hearth flows to a holding bath for ladling. 4 ref.  
(E10b, E23, W18; Al, 5-60)

**534-E.** Designing Vacuum Plaster Mold Castings. W. G. Wilkins. *Machine Design*, v. 29, Nov. 28, 1957, p. 106-108.  
(E16a, 1-73, 17-51)

**535-E.** Alloys for Making Castings. J. L. Rice, R. W. Ruddle and P. A. Russell. *Machinery Market*, v. 2979, Dec. 19, 1957, p. 22-24.

Recent developments in Cu and Al casting alloys. (To be continued.) (E-general; Cu-b, Al-b)

**536-E.** Alloys for Making Castings. J. L. Rice, R. W. Ruddle and P. A. Russell. *Machinery Market*, v. 2978, Dec. 12, 1957, p. 25-26.

Development in cast iron. (To be continued.) (E-general; CI)

**537-E.** Shell Molding. Negley Montett. *Pacific Factory*, v. 89, Apr. 1958, p. 26-27, 56.  
(E19c)

**538-E.\*** Cast Die Cavities. Pt. 1. Irwin Lubalin. *Precision Metal Molding*, v. 16, July 1958, p. 24-25, 52.

Toolsteel dies cast by the Shaw process have advantages over those produced by sand casting, shell molding or the lost wax processes. (E19, W19n; TS)

**539-E.\*** Electric Melting and Holding of Aluminum. Herbert Chase. *Precision Metal Molding*, v. 16, July 1958, p. 30-31, 60.

Briggs & Stratton Corp. uses battery of 14 induction melting furnaces for die casting Al alloys. They have a power rating of 100 kw. each and an hourly melting rate of 500 lb. (E10r, 1-69, E13; Al)

**540-E.** Are You Buying Tolerances You Don't Actually Need? William O. Sweeny. *Precision Metal Molding*, v. 16, July 1958, p. 26-27, 46-47.

Close tolerances in investment castings are to be balanced against increased costs. Cost savings can often be realized and greater accuracy achieved by finish machining. (E15, 17-53)

**541-E.** Russian Automated Precision Casting Plant. Peter Trippe. *Process Control and Automation*, v. 5, Apr. 1958, p. 158-163.  
(E15, 18-74)

**542-E.** (Russian.) New Machines and Appliances for Die Casting. V. M. Plyatskii. *Vestnik Mashinostroenia*, May 1958.  
(E13, 1-52)

**543-E.\*** (Book.) A Practical Guide to the Design of Steel Castings. 52 p, 1958. British Steel Castings Research Association, East Bank Rd., Sheffield 2, England. 12s/6d.

Designs for steel castings which facilitate molding, feeding and pouring that reduce the incidence of defects such as shrinkage cavities, tears, contraction cracks, pinholes and blowholes; unsatisfactory designs. (E11; ST, 17-51)

## Primary Mechanical Working

**199-F.** Induction Heating of Cast Steel Ingots. Michael C. D. Hobbs. *Instrumentation*, v. 11, Mar-Apr. 1958, p. 20-21.  
(F21b, W28s; ST, 5-59)

**200-F.** Institute of Metals Jubilee Meeting. Works Visits: Northern Aluminium Co., Ltd., Banbury. *Metal Industry*, v. 92, May 16, 1958, p. 405-406, 408.  
(F24; 18-67, Al-b)

**201-F.** Stainless Forging Takes Precise Control. *Steel*, v. 142, June 9, 1958, p. 92-94.  
(F22m; SS)

**202-F.** (French.) Fabrication and Uses of Large Extrusion in Aluminum and Light Alloys. Michel Costeraste and Pierre Bandet. *Revue de l'Aluminium*, v. 35, Apr. 1958, p. 427-437.  
(To be continued.) (F24; Al-b)

**203-F.** (Italian.) Machining of Metals by Means of Hot Plastic Deformation. Pt. 10. Drop Forges. Romeo Giusfredi. *Rivista di Meccanica*, v. 9, Mar. 13, 1958, p. 9-14.  
(To be continued.) (F22n)

**204-F.** (Russian.) Reduction of Waste Ends of Billets in Tubemaking. S. I. Orlov. *Stal'*, v. 18, Apr. 1958, p. 335-339.

By proper alignment of tube billets end irregularities were considerably reduced. Use of new lengthened-type mandrel improves performance of piercing mill and reduces number of tubes rejected due to inner flaws. (F26)

**205-F.\*** The Calculation of Drawing Force and Die Pressure in Wire Drawing. P. W. Whitton. *Institute of Metals, Journal*, v. 86, May 1958, p. 417-421.

An expression has been obtained in terms of the drawing variables which permits the prediction of drawing load and die pressure. Accuracy is within  $\pm 10\%$  over the wire drawing range, which halves the errors given by previous methods. Theories which assume homogeneous - deformation conditions, while extremely accurate at the very low angles, are not suitable generally. 14 ref. (F28)

**206-F.** Extruding Titanium. *Metal Industry*, v. 92, May 30, 1958, p. 445-446.  
(F24; Ti-b)

**207-F.** Aluminum Sheathing of Flat Uranium Plates by Extrusion Cladding. A. J. Mooradian. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, TID-7546, p. 120-141.

Process consists in using the U flat as a moving mandrel over which the sheath is extruded directly, thereby completely encasing the U with Al as it passes through the die. Both Ni plated and bare U flat elements sheathed in Al by the extrusion cladding method have been successfully tested under irradiation. (F21g, T11g; U, Al, 2-67)

**208-F.** Coextrusion Applied to the Fabrication of Solid or Disperse Fuel Elements. R. Montagne and L. Meny. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, TID-7546, p. 142-156.

Since the usual cladding methods were unsuccessful the bond was obtained by a process called "co-extrusion". It consists of simultaneously extruding the fuel and its cladding. (F24, T11g; U, Zr, 8-59)

**209-F.** Zirconium Cladding of Uranium and Uranium Alloys by Coextrusion. A. R. Kaufmann, J. L. Klein, P. Loewenstein and H. F. Sawyer. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, TID-7546, p. 157-181.

Fabrication of Zr-clad uranium fuel elements having integral Zr end seals. (F21g, T11g; U, Zr)

**210-F.** Preparation and Sheathing of Plutonium-Aluminum Fuel Alloys for the NRX Reactor. O. J. C. Run-

nalls and K. L. Wauchope. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, TID-7546, p. 778-788.  
(F21g, T11g; U, Al, Pu, 8-59)

**211-F.** Classical Heat Flow Problems Applied to Induction Billet Heating. R. M. Baker. *Applications and Industry*, no. 36, May 1958, p. 106-112. 5 ref. (F21b, 1-69, P11k)

**212-F.** Developments in Rod and Bar Rolling Progress During Post-War Period. R. Stewartson. *Iron and Coal Trades Review*, v. 176, Apr. 25, 1958, p. 992-993.  
(F23, W23d; ST)

**213-F.\*** Extrusion Through Single-Hole Staggered and Unequal Multi-Hole Dies. W. Johnson, P. B. Mellor and D. M. Woo. *Mechanics and Physics of Solids, Journal*, v. 6, May 1958, p. 203-222.

Calculations for the pressure for extrusion through perfectly smooth and rough wedge-shaped dies of small unequal angles; effects on the pressure and obliquity of the emergent sheet of inclining the die orifice to the direction of the punch travel. 20 ref. (F24, 3-74)

**214-F.** The Forging of Heat-Resisting Metals. A. H. Waine and J. R. Rait. *Metal Treatment and Drop Forging*, v. 25, May 1958, p. 191-196. 17 ref. (F22; SGA-h)

**215-F.** (Czech.) Geleji Formula for the Determination of Average Specific Pressure on Hot Rolling. Ladislav Hellebrand. *Hutnické Listy*, v. 13, no. 4, 1958, p. 313-315.

Proposes revision of Geleji formula which gives results more nearly in accordance with real values of average specific pressure on hot rolling. 5 ref. (F23, 1-66, 10-51)

**216-F.\*** (Russian.) Calculation of Pressure Produced by Metal on Rolls. Yu. M. Chizhikov. *Stal'*, v. 18, May 1958, p. 428-433.

Calculation of average pressure on rolls of blooming and sheet rolling mills by means of formulas; comparison with experimental data. Concluded that existing analytical methods for determining deformation resistance in rolling cannot give accurate results. 11 ref. (F23, 4-52, 4-53, 10-51)

**217-F.\*** (Russian.) Present State of Theory of Pressure Produced by Metal on Rolls in Longitudinal Rolling. A. I. Tselikov. *Stal'*, v. 18, May 1958, p. 434-441.

Dependence of metal pressure on rolls upon external zones and deformation speed. Possible ways to improve author's formula as to effect of external friction, width of strip and deformation resistance. Adjustment of formula to actual conditions. 36 ref. (F23, 10-51)

**218-F.\*** (Russian.) Manufacture of Alloy Steel Piping for High and Super-High-Pressure Boilers. S. I. Borisov. *Stal'*, v. 18, May 1958, p. 442-446.

Technology of rolling and heat treatment developed by laboratory and industrial experiments. Composition of experimental steels. Manufacture of pipes 219-273 mm. in diameter, and pipes less than 60 mm. in diameter. (F26s; AY)

**219-F.\*** (Russian.) Manufacture of Seamless Pipes From Cast Shells Produced by Vacuum Crystallization Method. Ya. B. Gurevich and V. E. Naimark. *Stal'*, v. 18, May 1958, p. 446-448.

Use of process for hard-to-work

steels. Experiments on 25-20 Cr-Ni steel. Technology of rolling and heat treatment. Experiments on steels with 19-23% Cr and 23-28% Ni by cold rolling. (Vacuum crystallization method was patented by V. E. Naimark and B. P. Nesterenko in 1940.) 7 ref. (F26g, F26s; SS)

**220-F. Indentation and Forging and the Action of Nasmyth's Anvil.** W. Johnson. *Engineer*, v. 205, Mar. 7, 1958, p. 348-3.0.

Pressure required to indent a block of metal by three or more dies of equal width when symmetrically situated; the solution proposed is formally identical with extrusion through a smooth wedge-shaped die. 6 ref. (F22, W24n, 1-52)

**221-F. Mill and Laboratory Evaluation of Oils for Rolling of Copper Alloys.** F. L. Reynolds. *Lubrication Engineering*, v. 14, Mar. 1958, p. 98-103, 120.

Lubrication of strip during rolling; staining tendency during anneal; separation in recovery operation. (F23; NM-h, Cu)

**222-F. Forging Practice as Related to Quality of Steel Used in Rotors for Steam Turbines and Turbo-generators.** N. V. Tikhomirov. *Metallovedenie i Obrabotka Metallov*, v. 4, Apr. 1958, p. 39-43. (Henry Bratcher, Altadena, Calif., Translation no. 4186.)

Defects in steam turbine and turbo-generator rotor forgings are associated with the metallurgy of the ingots and the forging and heat treatment. (F22, W11k, 17-57; ST)

**223-F. (German.) Extrusion of Copper-Chromium and Copper-Zinc-Chromium-Alloys.** Nurettin Cuhadar. *Istanbul Teknik Universitesi Bulteni*, v. 10, no. 3, 1957, p. 1-6. 5 ref. (F24; Cu-b, Cr-b, Zn-b)

**224-F. (Russian.) Relation Between Metal Pressure and Deformation Rate in Rolling.** M. Ya. Brovman and R. M. Shpigelman. *Stal'*, v. 18, Mar. 1958, p. 230-235.

Deformation rate has a considerable effect on the metal pressure in rolling. Formulas for determining this effect agree with the experimental data so far available but it is advisable to obtain a further check of their accuracy. 4 ref. (F23, 3-74)

**225-F. (Russian.) Force Distribution in the Cold Rolling of Tubes.** F. Shevakin. *Stal'*, v. 18, Mar. 1958, p. 235-240.

Investigation of the effect of basic factors on the force distribution in the cold rolling process revealed several possibilities for increasing rolling mill output. (F26s)

## Secondary Mechanical Working

### Forming and Machining

**321-G.\* Property of Free Machining.** K. G. Lewis. *Iron and Steel*, v. 31, May 1958, p. 179-183.

Effects of various cutting fluids on machinability and cutting performance of sulphurized or leaded steels. Effect of Pb and similar metallic additives on machining characteristics, structure and mechanical properties of alloy steels, Cu and Al alloys; importance of graphite in machining cast iron; development of free machining prop-

erties by means of cold working and heat treatment. (Concluded.) 15 ref. (G17k, 2-60; ST, Cl, Cu-b, Al-b, Pb, S, NM-h)

**322-G.\* The Forming of Flanged and Dished Heads.** H. S. Beers. *Iron and Steel Engineer*, v. 35, May 1958, p. 110-114.

Special machines at Colorado Fuel and Iron Corp. form hemispherical, elliptical or conical heads in steel, stainless, Cu, Ni, Al and their alloys from starting materials over 3/16 in. thick. (G13; SS, ST, Cu, Ni, Al)

**323-G. Machining Blades for Gas Turbine Units.** *Machinery (London)*, v. 92, May 1958, p. 1082-1094. (G17, T7h)

**324-G. Roll Forming Highway Guardrail.** *Modern Industrial Press*, v. 20, May 1958, p. 17-19.

Coil stock of hot rolled, Zn coated 12-gage steel strip punched and formed to "deep beam" guardrail on a continuous line. (G11; ST, 4-53)

**325-G. No-Draft "Pressings" Save Three Ways.** Collins Fuqua. *Modern Industrial Press*, v. 20, May 1958, p. 27-28.

"Pressings" produced by placing pretrimmed blank on a heated mating die and applying sufficient pressure to make metal flow. Mg and Al alloys pressed under conditions similar to conventional forgings do not require draft angle allowance. Machining costs reduced; less processing space and less raw materials. (G1; Al-b, Mg-b)

**326-G. Aluminum Tubing Saves Machining Costs, Weight, Over Solid Bar Stock.** *Western Metalworking*, v. 16, May 1958, p. 52-53. (G17; Al-b, 4-60)

**327-G.\* (German.) Cold Die Sinking of Steel.** K. E. Thelning. *Werkstattstechnik und Maschinenbau*, v. 48, Apr. 1958, p. 209-215.

Free sinking using cylindrical ram; sinking with holding ring; relationship between sinking depth and hardness of material and diameter of ram. Other factors influencing sinking depth. Practical examples. (G16; ST)

**328-G. (Japanese.) Soviet Metalworking Technology.** Ketsu Inoue. *Metals*, v. 28, Apr. 1958, p. 260-264. (G17)

**329-G. Slice and Electrogrind Honeycomb for B-52 Panels.** William G. Koehler. *American Machinist*, v. 102, June 16, 1958, p. 93-95. (G17b, G18, T24b; Al, SS, 7-59)

**330-G.\* High Speed Machining. A New Concept.** William E. Montgomery. *Carbide Engineering*, May 1958, p. 9-11.

New titanium carbide uses Ni as a binder and contains molybdenum carbide as an alloy carbide addition. Typical applications. (G17; SGA-j; Ti, 6-69)

**331-G.\* Hot-Sizing Titanium and High Temperature Steel Parts.** Charles O. Herb. *Machinery*, v. 64, June 1958, p. 118-121.

Hot sizing presses eliminate wrinkles and warped surfaces from cold formed parts of titanium and stainless steel. Workpiece can range from 0.005 to 0.093 in. thick. Less than 8% of the time needed formerly with bench work is required. (G1; Ti)

**332-G.\* Applications of a Verson-Wheelon Press in the Production of Helicopter Parts.** *Machinery (London)*, v. 92, June 6, 1958, p. 1345-1350. Method of operation of the ma-

chine, which is rated at 10,800 tons. The workpiece is placed on a form block, and pressure is applied, through a thick rubber working pad, by means of an inflatable rubber bag, in which an oil pressure of 5000 psi. is exerted. (G14a, W24g)

**333-G.\* Titanium Fabrication.** L. P. Spalding. *North Atlantic Treaty Organization Advisory Group for Aeronautical Research and Development*, Report 96, 1957, 33 p.

Detailed survey of material preparation, forming (bending, stretch forming, drop hammer forming, deep drawing), machining, chemical milling, heat treatment, cleaning and pickling, welding and salvage. 8 ref. (G-general, J-general, K-general, L-general; Ti)

**334-G.\* Shotpeening Effects and Specifications.** Henry O. Fuchs. Paper from "Metals", ASTM STP No. 196, p. 22-32.

Specifications for shot are concerned with material, shape and size. The specifications of the shot stream intensity are based on the measurement of residual stress effects in a standard sample—the Almen strip; by a standard instrument—the Almen gage. 8 ref. (G23n)

**335-G.\* (French.) Ultrasonic Machining.** M. Deribere. *Mecanique*, v. 42, Feb. 1958, p. 59-63.

Principle of ultrasonic machining; abrasives used; metals machinable by this method; machines and tools employed. 23 ref. (G24c)

**336-G.\* (German.) Machining of Titanium.** Hans D. Weckener. *Das Industrieblatt*, v. 58, Apr. 1958, p. 119-123.

Physical properties of Ti. Composition of the most important Ti alloys and mechanical properties of some of them. Special conditions of boring, threading, reaming, milling, grinding and sawing. Examples of machining. (G17; Ti)

**337-G.\* (German.) Argon Arc Flame Cutting of Nonferrous Metals.** *Das Industrieblatt*, v. 58, Apr. 1958, p. 167.

Peculiarities of arc cutting of non-ferrous metals. Cutting method using argon and hydrogen. Cutting speed and gas consumption in case of manual and mechanical burner feed. (G22h)

**338-G. (Russian.) Oxygen-Arc Cutter for Carbon Steels.** *Stanki i Instrument*, Mar. 1958, p. 43.

Electrically heated oxygen cutter using an ordinary carbon electrode. Oxygen is led to the hot metal through a tube resembling an ordinary cutting torch. An eye shield is attached to the cutter. D.C. current of 200 amp. may be supplied by the usual welding generator. (G22; CN)

**339-G. (Russian.) Cutting Forces in the Machining of Aluminum Alloys.** E. I. Feldshtein. *Vestnik Mashinostroina*, May 1958, p. 62-65. (G17; Al-b)

**340-G. (Russian.) Modern Methods in the Electro-Erosion Machining of Metals.** B. R. Lazarenko and N. I. Lazarenko. *Vestnik Mashinostroina*, May 1958, p. 65-69. (G24a)

**341-G. (Russian.) Some Problems Relating to the Physical Character of Ultrasonic Machining.** I. S. Vainsh-tok. *Stanki i Instrument*, Apr. 1958, p. 13-14. (G24c)

**342-G.\* Factors Influencing the Performance of Grinding Wheels.** E. J. Krabacher. *American Society of Mechanical Engineers*, Paper No. 58-SA-40, 1958, 7 p.

Measured wear may be translated into terms of grinding ratio. This generally accepted parameter for measuring wheel wear is the ratio of the volume of metal removed per unit volume of wheel worn away. Grinding ratio decreases with increased metal-removal rate and increases with workpiece diameter, decreased chip load, and increased concentration of grinding fluid. 5 ref. (G18, Q9)

**343-G. A Study of the Effects of Tool Flank Wear on Tool Chip Interface Temperature.** D. R. Olberts. *American Society of Mechanical Engineers*, Paper No. 58-SA-41, 1958, 5 p.

Effect of land wear upon the interface temperature between a carbide tool and an AISI 1015 steel workpiece. (G17, Q9, CN)

**344-G.\* Controlled Contact Cutting Tools.** B. T. Chao and K. J. Trigger. *American Society of Mechanical Engineers*, Paper No. 58-SA-42, 1958, 9 p.

A substantial reduction in power consumption, an increase in tool life, more effective utilization of cutting fluids and improved surface finish on the machined workpiece have been achieved by suitably controlling the length of tool-chip contact. Reasons for these findings discussed in terms of basic variables in chip formation mechanics. 15 ref. (G17)

**345-G.\* Beryllium Machining Characteristics.** Donald R. Walker. *American Society of Mechanical Engineers*, Paper No. 58-SA-43, 1958, 6 p.

Beryllium chip formation is predominantly a brittle fracture process irrespective of the cutting speed, feed or tool geometry used; however, some plastic flow of the chip is observed. Chip uniformity and surface finish improve with light feeds and high tool rake angles. Surface cracking, stick-slip friction and built-up-edge formation on cutting tools are phenomena associated with Be cutting. 5 ref. (G17; Be)

**346-G.\* The Effect of a Lead Additive on the Machinability of Alloy Steels.** Norman Zlatin and John V. Gould. *American Society of Mechanical Engineers*, Paper No. 58-SA-53, 1958, 6 p.

Results of turning tests, using carbide tools, on AISI 4147H and AISI 4340H plain and leaded steels at different hardness levels. Data demonstrate at what hardness levels the lead additives are most effective. (G17k, 2-60; AY, Pb)

**347-G.\* Concentrated Wear of Turning Tools.** V. Solaja and D. R. Cliffe. *Metal Treatment and Drop Forging*, v. 25, May 1958, p. 187-190.

Experiments on cutting carbon steel with carbide-tipped tools demonstrate influence of work-piece surface condition on intensity of localized wear and groove formations. Relation between tool wear and deformation of surface layer. 8 ref. (G17, Q9; CN)

**348-G.\* Chemical Milling: How to Do It.** Ken Clark. *Metalworking Production*, v. 102, May 30, 1958, p. 947-949.

Detailed steps of masking, trimming, etching variables, etch bath procedures. (G24b)

**349-G. Steel Fabrication Lighter Than Aluminum.** James E. Teeter and R. Rohrberg. *Metalworking Pro-*

*duction*, v. 102, May 30, 1958, p. 950-951.

Anti-icing nozzles for fighter planes are now made of stainless steel instead of Al. Stronger material reduces manufacturing costs 27% and cuts weight 50%. Nozzles are formed in halves, then welded together. (G-general, KId; SS)

**350-G. Drilling and Reaming With Gun Type Tools.** Herbert Gregg. *Tool Engineer*, v. 40, June 1958, p. 79-84.

(G17e, W25p)

**351-G. Milling Practice Today.** A. O. Schmidt and J. R. Roubik. *Tool Engineer*, v. 40, June 1958, p. 113-115.

(G17b)

**352-G. (German.) Bending of Aluminum Tubes and Sections.** W. Hegmann. *Aluminium*, v. 34, May 1958, p. 266-276.

(G6; Al, 4-60)

**353-G.\* (Russian.) Electro-Erosional Properties of Metals.** A. S. Zingerman. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 58-67.

Electro-erosion is produced by heat transferred through the discharge canal of an electrode. The erosion is in proportion with the discharged energy and its duration. The dependence of critical energy on critical duration appears to be the limit of electrical erosion. 9 ref. (G24a)

**354-G. Machining Ultra-High-Tensile Steels. Pt. 2. Drilling and Tapping Tests: Importance of Drill-Point Concentricity and Re-Introduction of Serial Taps for Uniform Metal-Removal.** H. J. Pearson. *Aircraft Production*, v. 20, Mar. 1958, p. 114-118.

(G17e, G17f; ST, SGB-a)

**355-G.\* Grinding a Titanium Alloy With Coated Abrasives.** D. E. Cadwell, H. L. Weisbecker and W. J. McDonald. *American Society of Mechanical Engineers*, Paper No. 58-SA-44, 1958, 9 p.

Effects of load, speed, mineral, grit size, lubricant, and in the case of water-based lubricants, lubricant concentration. Lubrication was most significant factor in abrasive performance. Performance increases with load, decreases with speed. 8 ref. (G18; Ti-b)

**356-G. Finishing Carbide Dies for Cold Extrusion Production.** *Carbide Engineering*, v. 10, June 1958, p. 27-31.

Lapping and finishing of carbide dies with diamonds reduces surface friction and prevents lubricant cutting under working pressures. (G19p; T6r, G5)

**357-G. Production Impact Extruding Steel.** *Engineering*, v. 185, Mar. 7, 1958, p. 306.

(G5; ST)

**358-G. What Is Super Finishing?** *Grinding and Finishing*, v. 3, Mar. 1958, p. 28-30.

(G19q)

**359-G. Report on Mechanized Billet Grinding Tests in Sweden.** C. E. Foogde. *Grits and Grinds*, v. 49, Jan. 1958, p. 3-15.

(G18; ST, 5-59)

**360-G. A Few Aspects of the Chemical Reactions Occurring During the Use of Abrasives.** Vittorio Satta. *Industrial Diamond Review*, v. 18, May 1958, p. 94-95, 99.

(G18, Q9)

**361-G. Comments on the Cutting of Metal Plates With High Explosive Charges.** W. E. Drummond. *Journal of Applied Mechanics*, v. 25, June 1958, p. 184-188.

Problem is analyzed by treating the metal hydrodynamically. The hydrodynamic problem is solved in the linearized approximation and it is assumed that the metal splits wherever the pressure becomes sufficiently negative. (G24)

**362-G. The Manufacture of Titanium Jet Engine Parts at Lower Costs by Extrusion.** Neil J. Feola. *Society of Automotive Engineers*, Preprint, 14B, Jan. 1958, 10 p.

(G5, T24b; Ti)

**363-G. (German.) Cemented Carbide Tools in Action.** K. H. Frohlich. *Industrie-Anzeiger*, v. 80, Mar. 7, 1958, p. 273-277.

(G17; T6n, 6-69)

**364-G. (German.) Economical Belt Grinding of Titanium.** B. Rupprecht. *Industrie-Anzeiger*, v. 80, Mar. 7, 1958, p. 280-284.

9 ref. (G18; Ti-b)

**365-G. (Russian.) Operation of Overhung Die in Sheet Steel Bending.** Y. I. Elovkov and A. I. Rozinov. *Vestnik Mashinostroenia*, May 1958, p. 51-54.

(G6; ST, 4-53)

**366-G. (Russian.) Cutting Forces and Durability of Cutters in Gear Cutting.** V. V. Guseva. *Vestnik Mashinostroenia*, May 1958, p. 57-60.

(G17g)

**367-G. (Russian.) High-Speed Turning of High-Strength Cast Iron.** N. P. Golubov. *Vestnik Mashinostroenia*, May 1958, p. 60-61.

(G17a; CI)

**368-G. (Pamphlet.) Magnesium Tooling Plate Shop Manual.** 55 p. 1958. Dow Chemical Co., Midland, Mich.

Use of Mg extrusions in tooling, shop characteristics of Mg alloys, machining, grinding, polishing, joining, surface protection. (G17, W25, 17-57; Mg, 4-58)

**369-G. (Book.) Techniques of Pressworking Steel Metal.** Donald F. Eary and Edward A. Reed. 472 p. 1958. Prentice Hall, Inc., 70 Fifth Ave., New York 11, N. Y. \$12.

Press types, sheet-metal operations, mechanical handling devices, toolsteel. Emphasis is on die design. (G1, W24n; ST)



**91-H. (English.) Sintering of Multi-Phase Bodies. Pt. 3. Sintering of Mixtures Containing Low-Melting-Point Powders.** B. Ia. Pines, A. F. Sirenko and N. I. Sukhinin. *Soviet Physics, Technical Physics*, v. 2, 1958, p. 1763-1772. (Translation by American Institute of Physics.)

Contraction of samples of single-component powders (copper) depends to a great extent on the initial porosity and the compression pressure (presence of closed pores filled with gas). As the compression pressure increases the amount of contraction first decreases but later the curve changes sign (i.e., contraction is replaced by "growth" and increase of the dimension of the samples after sintering takes place). "Growth" occurs whenever the pressure of the gas in the closed pores in the heated samples exceeds the "negative" capillary pressure acting at the surface of the pores. 5 ref. (H15; Cu)

**92-H.\* (French.) Study of Metallic Cobalt Powders Obtained by Pyrolysis**

**From Normal Alcanoates.** Claude Moreau and Georges Rodier. *Comptes Rendus*, v. 246, Mar. 24, 1958, p. 1861-1864.

Preparation of metallic Co of variable texture by thermal decomposition in controlled atmosphere of anhydrous salts of fatty acids of the  $(RCOO)_2Co$  type; measurement of specific surface of powders, radio-crystallographic study and electron microscope examination. 6 ref. (H10c; Co)

**93-H.\*** (German.) **State of Development of Technique for Producing Sintered Parts of Complicated Shape.** H. Silbereisen. *Fertigungstechnik*, v. 8, Apr. 1958, p. 163-169.

Increased production of sintered parts through application to more complicated shapes could be obtained through improvements in materials and techniques employed in the sintering process. Methods for obtaining these improvements and prospects for new fields of application. (H-general)

**94-H.** **Powder Metallurgy Scores Impressive Gains.** Andrew W. Shearer. *Automotive Industries*, v. 118, Apr. 15, 1958, p. 54-56, 116-118, 120.

Applications in the automobile industry. (H-general, T21, 17-57)

**95-H.** (English.) **Preparation of High Purity  $U^{235}$  and  $U^{238}$  Powders.** Soviet Journal of Atomic Energy, v. 3, no. 9, 1957, p. 1072-1073. (Translation by Consultants Bureau, Inc.)

Powders of these isotopes are obtained by reducing uranium dioxide by means of calcium in a reaction vessel. Metallic powder yield is 97-98% from the dioxide. Yield obtained by hot pressing of parts consisting of these powders is greater than 99%. (H10c, H14h; U, 14-63)

**96-H.** **Direct Rolling of Steel Sheets From Granulated Pig-Iron.** B. Kalling, S. Eketorp and S. Backstrom. *Iron and Coal Trades Review*, v. 176, Feb. 28, 1958, p. 495-500. (From *Jernkontorets Annaler*, v. 141, no. 6, 1957, p. 317-331.)

Previously abstracted from original. See item 73-H, 1957. (H14j; Fe, ST)

**97-H.** **Sintered Aluminium S. A. P. F. Bollenrath.** North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development, Report no. 103, Apr. 1957, 18 p.

Methods used by the Aluminium-Industrie A.G., Neuhausen, allow the fabrication of sintered bodies from pure Al powder containing limited percentages of aluminum oxides. 7 ref. (H-general; Al)

**98-H.\*** **Compacting of Powders Using Molds Made From Reversible Gels.** T. W. Penrice. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 1-6.

Plasticized polyvinylchloride in gel form is placed around the die pattern. The gel is sufficiently rigid to maintain its shape when the pattern is removed and powder placed in the cavity, but acts like a liquid under pressure, transmitting pressure equally over the powder, resulting in high densities and dimensional control. (H14g)

**99-H.\*** **The Continuous Production of Strip by the Direct Rolling Process.** D. K. Worn. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 7-13.

Direct rolling process for metal powders is currently uneconomical to compete with conventional methods for common alloys, but useful in specialized applications, involving nuclear components, or alloys too brittle for ordinary rolling. 17 ref. (H14j; 4-53)

**100-H.\*** **Consolidation of Metal Powders by Hot Working Within Sheaths.** J. Williams. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 14-23.

Hot consolidation of metal powders within metal sheaths makes available a number of methods for the production of a wider variety of shapes and sizes than is possible with the normal powder metallurgical techniques. Chemically reactive metal powders can be densified without the need for special atmospheres. (H14h, F21g)

**101-H.\*** **Developments in Vacuum Sintering Furnaces.** M. Donovan. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 24-32.

Vacuum equipment, heating system, and thermal insulators; induction, radiation and direct heating, use of radiation screens and other techniques. (H15q, 1-73, 1-52)

**102-H.\*** **Conditions for Effective Vacuum Sintering and Their Realization in Practice.** Otto Winkler. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 33-40.

Two types of adsorption, the desorption process, evaporation, and vacuum sintering practice. (H15q, 1-73)

**103-H.\*** **The Pressureless Sintering of Loose Beryllium Powder.** T. R. Barrett, G. C. Ellis and R. A. Knight. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 41-49.

New technique established on a production basis allows consolidation of loose Be powder to high densities without application of pressure. Possibility of direct fuel-element production by sintering the powder around an uranium ceramic core. (H15n; T11g; Be)

**104-H.\*** **Zone Sintering.** J. Antill and M. Gardner. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 50-63.

Method of firing developed called "zone sintering" simplifies methods for making dense tubes and rods from powders. The technique is analogous to zone melting and consists of steadily passing a furnace at the sintering temperature over the "green ware". The method has been applied to thorium, uranium and "Hylumina" (an alumina-base refractory). (H15n; Th, U)

**105-H.\*** (Rumanian.) **Effect of Sintering Degree on the Properties of the Double Ferrites of Nickel.** Elena Labusca and Gheorghe Stanku. *Studii si Cercetari de Metalurgie*, v. 2, no. 4, 1957, p. 483-490.

Increase of maximum sintering temperature leads to increase of density and magnetic permeability and decrease in electrical resistivity. For a certain composition of the ferrite it is thus possible to ob-

tain sintered materials with different properties as a function of the degree of sintering. 7 ref. (H15, P10a, P15g, P16q, 2-61; Fe, Ni, 6-72)

**106-H.** (Book.) **Developments in the Practice of Compacting and Sintering.** Powder Metallurgy Joint Group of the Iron and Steel Institute and the Institute of Metals, Mar. 19, 1958, Church House, London, S.W.1, England.

Papers abstracted separately. (H14, H15)

## Heat Treatment

**199-J.** **Continuous Strip Annealing of Steel.** E. J. Ocean and C. B. Kiehle. *Industrial Gas*, v. 36, Nov. 1957, p. 5-7, 20.

The three most widely used furnace types, six methods of heat application using natural gas as fuel and eight advantages of continuous process. (J23, 1-61, W27g; ST)

**200-J.** **Opened Coil Annealing With Recuperative Heating Increases Production Capacity.** *Industrial Heating*, v. 25, May, 1958, p. 949-950, 952, 954, 956, 958, 960.

(J23, W27; ST, 4-53)

**201-J.** **Isothermal Annealing Below 60° K of Deuteron Irradiated Noble Metals.** G. D. Magnuson, W. Palmer and J. S. Koehler. *Physical Review*, v. 109, Mar. 15, 1958, p. 1990-2002.

Foils of 99.999% pure Cu, 99.999% pure Ag, and a Cu alloy containing 3.78 at. % Ni were irradiated near liquid helium temperature with 10.7-Mev deuterons. Annealing up to 60° K. was performed in a series of isothermal steps. During each anneal the decrease of the radiation-induced resistivity increment with time was observed. 29 ref. (J23; 2-67; Cu, Ag, 14-70)

**202-J.\*** (French.) **The "Recovered State" Renews Transformation Conditions and Use Properties of Metals.** Jean Herenguel. *Revue de l'Aluminium*, v. 35, Apr. 1958, p. 405-416.

Structural evolution of partially annealed, cold worked metals and accompanying metallurgical phenomena. Relative mechanical properties of some Al and Cu alloys and conductor wires after conventional heat treatments and recovery-type treatments. Industrial possibilities. 10 ref. (J23, N4, Q-general; Al, Cu)

**203-J.** (Japanese.) **Study on Spheroidal Graphite Cast Iron.** Pt. 1. Hideji Hotta and Toru Saruwatari. *Japan Foundrymen's Society, Journal*, v. 30, Mar. 1958, p. 137-144.

Relationship between heat treatment and mechanical properties at room and high temperatures of spheroidal graphite cast iron melted in a heavy oil furnace. 10 ref. (J-general, Q-general; CI-r)

**204-J.** **Sub-Zero Quench Tames Formed Aluminum.** R. J. Delaney. *American Machinist*, v. 102, June 16, 1958, p. 106-107.

(J26q, G1, G17, K3n, 2-63; Al-b)

**205-J.** **Designing With Heat Treated Steels.** John L. Everhart. *Materials in Design Engineering*, v. 47, June 1958, p. 121-136.

Results that can be achieved by annealing, normalizing, quenching

and tempering, martempering and austempering. Heat treatments and the properties they give; selecting the steel and the design; fundamentals of the heat treatment of steel; definitions of heat treating terms. 12 ref. (J-general, Q-general; 17-51; ST, 2-64)

- 206-J.** Heat Treating of Roller Bearings Is Geared to Automatic Production. Leo H. Everitt and O. E. Cullen. *Metal Progress*, v. 73, June 1958, p. 67-73.

Timken has unveiled its Bucyrus, Ohio, plant which has an annual capacity of 27,000,000 roller bearings. Production is completely automatic from machining through heat treating to packaging. Much of the success is credited to the push-button heat treat operation of five lines, using 22 furnaces for carburizing, hardening and tempering the bearing components. (J26, J28, J29, T7d, 18-74, 1-52)

- 207-J.** New Method Speeds Annealing. *Metal Progress*, v. 73, June 1958, p. 97-98.

Coils of carbon steel from cold mill are rewound to provide space between laminations. This speeds up heating and cooling, improves temperature uniformity. A recuperative method salvages heat from cooling coils for use in preheating cold coils. The new system promises a significant reduction in annealing costs. (J23; 1-55; ST, 4-53)

- 208-J.** Two Steps to Heat Treat Savings. *Steel*, v. 142, June 16, 1958, p. 100-101.

Induction hardening of critical areas of automotive steering knuckles to boost fatigue life permits use of less expensive steel; a switch from press quenching to hot oil quenching. (J2g, J26n, T21c; ST)

- 209-J.** Grain Refinement of Uranium by Heat-Treatment and Alloying. E. E. Hayes. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, TID-7546, p. 75-101.

Practical refinement of grain structures in unalloyed uranium is based on rapid cooling through the beta-alpha phase transformation. Additional refinement of rapidly cooled uranium may be obtained by a recrystallization process during a short-time anneal in the high-alpha phase. Alloys of uranium containing up to several per cent additive that can be used for grain-size control. Chromium, silicon and zirconium are among the most effective grain-refining elements. 15 ref. (J26, J23, M27c; U, AD-p35)

- 210-J.** (Dutch.) Air Flame Hardening of Rails for Curves. H. W. Ruddy. *Lasteniek*, v. 24, May 1958, p. 89-92. (J2h, T23q)

- 211-J.\*** (German.) Austenitizing During Rapid Heating. A. Rose. *Das Industrieblatt*, v. 58, Apr. 1958, p. 160-166.

Flame hardening as a rapid heating method. Investigation of austenite formation on subeutectoid steels. Decomposition diagrams showing transformation during austenitizing. Kinetics of austenite formation. Heating process in flame hardening. Austenite formation during flame hardening. Effect of starting structure. (J2h, N8f; ST)

- 212-J.\*** (German.) Application of Radiochemical Methods in Study of Carburization. H. Orng. *Das Industrieblatt*, v. 58, Apr. 1958, p. HT 27-30.

Application of carbon-14 in study of carburization problems. Investi-

gation on mechanism of carburizing and role of sodium carbonate. Carbon atom exchange between sodium carbonate and sodium cyanide. 8 ref. (J28g, 1-59)

- 213-J.** (German.) Progress in Gas Carburizing in British Timken Ltd. J. H. Evans. *Das Industrieblatt*, v. 58, Apr. 1958, p. HT 31-32. (J28g, T7d)

- 214-J.\*** Effect of Carbon on the Grain Refinement of Uranium. L. M. Howe. *Atomic Energy of Canada Limited*, CRMet-751, Apr. 1958, 25 p.

Grain is refined in samples which have been quenched from the beta phase and annealed at high alpha-phase temperatures. Study of microstructures supports a recrystallization mechanism for this grain refinement. The effect of carbon content on the magnitude of grain refinement in the surface layers is small whereas the effect on the interior of the sample is large; the degree of refinement increased with increasing carbon content within the range 10 to 1000 ppm. 8 ref. (J26, J23, M27c, 2-60; U, C)

- 215-J.\*** The Annealing Control of Malleable Cast Iron Pipe Fittings. Daizaburo Koyama. *Hitachi Review*, v. 7, Mar. 1958, p. 21-25.

Annealing malleable iron in a tunnel-type furnace; control factors; heat cycle, fuel economy, chemical composition. Controlling the chemical composition, Si in particular, is the most important factor. 15 ref. (J23; CI-s)

- 216-J.** Combine Nitriding, Induction Hardening on Low-Alloy Steel. P. M. Unterweiser. *Iron Age*, v. 181, June 19, 1958, p. 122-124.

(J28k, J2g; AY-b)

- 217-J.** Carburizing of Steel: Methods, Properties and Applications. A. G. Gardner. *Mechanical World and Engineering Record*, v. 138, May 1958, p. 201-205.

Applications and advantages in the light of recent improvements. (J28g; ST)

- 218-J.\*** Liquid Metal and Salt Baths. A. D. Hopkins. *Metal Treatment and Drop Forging*, v. 25, May 1958, p. 197-204.

Lead baths, cyanide-containing salt baths for case hardening, neutral salts for hardening and annealing, nitriding baths and "Sulfinox" baths. Fluctuation of type and depth of case resulting from carburizing or nitriding baths of various concentrations with changes in treatment time and temperature. Advantages of neutral salts for hardening, hypothermal transformations, tempering or annealing. (J2j, J28, W28p)

- 219-J.\*** (German.) Control of Salt Baths. Otto Schaab. *Draht*, v. 9, May 1958, p. 175-177.

Control of physical effect; heat transfer; composition of baths; direct and indirect measuring methods, measuring apparatus; effect of quenching speed and circulation speed; indirect method of bath evaluation by means of test hardening. (Concluded.) 15 ref. (J2j, S18)

- 220-J.** Toughening High-Strength Steel by Warm Working. E. J. Rippling. *American Society for Testing Materials, Preprint*, no. 74, 1958, 10 p. 10 ref. (J2g, Q23; ST, SGB-a)

- 221-J.** New Alloy Steels Beat Process Bugaboos. Pt. 2. D. B. Roach and A. M. Hall. *Chemical Engineering*, v. 65, June 2, 1958, p. 134-138.

High-strength precipitation-hard-

ening stainless made by a simple heat treatment stands up to high-temperature, corrosive chemical process conditions. (J27; SS, Al, Cu, Mo)

- 222-J.** Magnetic Field Hardens Surface Skin. John C. Lewis. *Design Engineering*, v. 4, June 1958, p. 51-54.

Induction heating applications for hardening, forging, brazing and other fields. (J2g, F21b, K8k)

- 223-J.** The Metallurgy of Tempering and Annealing in Fractional Minutes. R. K. Wuerfel. *Industrial Heating*, v. 25, June 1958, p. 1128-1130, 1132, 1134, 1136.

Master curves simplify the selection of tempering and annealing cycles. 4 ref. (J2g, J23, J29; ST)

- 224-J.** New Horizons in Continuous Strip Heat Treatment. G. J. Langenderfer. *Industrial Heating*, v. 25, June 1958, p. 1168-1170, 1172, 1174, 1176, 1178.

Treating lines are operated by primary producers of both ferrous and nonferrous metal strip. (J-general; 4-53)

- 225-J.** The Production of Ball and Roller Bearings. *Machinery (London)*, v. 92, June 1958, p. 1372-1380.

Methods and equipment employed by the Hoffmann Manufacturing Co., Ltd., Chelmsford, England. (J28, T7d)

- 226-J.** Harder Stainless Practical. Robert N. Libsch. *Steel*, v. 142, June 30, 1958, p. 85-86.

Method of nitriding using both salt bath and gas treatment applicable to all types of stainless steel. (J28k; SS)

- 227-J.** Magnetometric Study of Electric Heating for Tempering of Steel. V. N. Gridnes, V. G. Permyakov and V. T. Cherepin. *Metallovedenie i Obrabotka Metallov*, v. 4, Apr. 1958, p. 9-16. (Henry Brucher, Altadena, Calif., Translation no. 4182.)

Processes occurring during the high-speed electric heating of quenched carbon steel and the phase composition resulting from heating to different temperatures were studied with the aid of a differential magnetic method. 9 ref. (J29, N8a; CN)

- 228-J.** Isothermal Bright Quenching of Cold Coiled Springs of 60C2A Steel. B. V. Venkov, I. I. Borisova and M. A. Noskova. *Metallovedenie i Obrabotka Metallov*, v. 4, Apr. 1958, p. 44-45. (Henry Brucher, Altadena, Calif., Translation no. 4187.)

Method of constant-temperature bright quenching applied to cold coiled spring of wire up to 6 mm. section was found to reduce the number of labor-consuming operations and lower production costs. (J26n, T7c; ST)

- 229-J.** Improved Heat Treating Practices for Some Forged Auto Parts. A. E. Shevelev. *Metallovedenie i Obrabotka Metallov*, v. 4, Apr. 1958, p. 45-49. (Henry Brucher, Altadena, Calif., Translation no. 4188.)

The stability of the austenite in the normalizing and heat treating of a forging depends on the preceding hot plastic deformation; the greater the degree of forging the greater the magnitude of the residual stresses and the less stable the austenite. An increase in the austenitization temperature or in the exposure time to austenitization leads to partial decomposition of the solid solution and the precipitation of ferrite, the intensity of the process increasing with the

austenitization temperature.  
(J22, N8, T21c; ST, 4-51)

**230-J.** (German.) Control of Salt Baths for Heat Treatment. Otto Schaaber. *Draht Fachzeitschrift*, v. 9, Mar. 1958, p. 85-89.  
(J2j)

**231-J.** (German.) Applications of Electrical Heating in a Steel Mill. F. Hahne and H. Schmitz. *Elektro-Wärme*, v. 16, Mar. 1958, p. 62-67.  
(J-general, F21b, W27j; ST)

**232-J.** (German.) Applications of Electrical Heating in a Tube Plant. E. Hörmann. *Elektro-Wärme*, v. 16, Mar. 1958, p. 68-71.  
8 ref. (J-general, F21b, W27j, 4-60)

**233-J.** (German.) Economics of Energy Consumption in a Steel Mill With Special Reference to the Introduction of Electric Heating. K. Sauer. *Elektro-Wärme*, v. 16, Mar. 1958, p. 71-75.  
(J-general, F21b, W27j; ST)

**234-J.** (German.) Applications of Electrical Heating in a Plant Producing Semifinished Light Alloy Parts. H. H. Croeck. *Elektro-Wärme*, v. 16, Mar. 1958, p. 90-94.  
(J-general, W27j; EG-a39)

## Assembling and Joining

**326-K.** Resistance Welding of Platinum-10 Per Cent Rhodium Wire to Platinum Sheet. C. E. Moeller. *American Society of Mechanical Engineers*, Paper no. 57-A-118, Aug. 1957, 9 p.  
(K3; Pt, 4-53, 4-61, SGA-a)

**327-K.** High-Temperature Brazing Looks Good for Missile Parts. John V. Long and George D. Cremer. *Aviation Age*, v. 29, May 1958, p. 30-31.  
(K8, T24; Ag, SS)

**328-K.** A Method for Soldering Aluminum. G. M. Bouton and P. R. White. *Bell Laboratories Record*, v. 36, May 1958, p. 157-160.

New technique using Zn-base solders. (K7; Al-b)

**329-K.** How to Braze Stainless Steels. Pt. 4. H. M. Webber. *Industrial Heating*, v. 25, May 1958, p. 895-896, 898, 900, 902, 904.

(Concluded.)  
(K8j, W29j, 1-73, 2-67; SS)

**330-K.** Six Steps for Dip Brazing of Magnesium Assemblies. William J. Graves. *Industry and Welding*, v. 31, June 1958, p. 38-39.

Magnesium alloy parts dip brazed with parent metal base filler alloys in chloride-base fluxes.  
(K8n; Mg-c, RM-q)

**331-K.** New High Speed Automatic Welding Process. *Industry and Welding*, v. 31, June 1958, p. 51, 65.

Process and equipment using new flux-containing, coiled wire electrode; arc welds 16-gage to 1/2-in. steel at speeds to 300 in. per min. (K1, 1-52)

**332-K.** Flash Welding Jet Rings Cuts Cost. *Industry and Welding*, v. 31, June 1958, p. 52, 54.

Preshaped Ti used for jet engine rings reduces cost of machining. Rings are made in three steps; forming, flash welding and sizing.  
(K3r; Ti)

**333-K.** Alloy Selection for Brazing. L. V. LaRou. *Machine Design*, v. 29, Nov. 1957, p. 132-135.

Criteria in selection of Ag or Cu brazing process. (K8; Cu, Ag, SGA-f)

**334-K.** Sandwich Panel Adhesives. R. K. Humke. *Product Engineering*,

v. 29, May 1958, p. 56-60.  
(K12, 7-59; NM-d34)

**335-K.** New Welder Saves Firm \$150,000 Yearly. *Steel*, v. 142, June 9, 1958, p. 88-89.  
(K1d, K9, 1-52)

**336-K.\*** Factors Affecting Weldability of High Strength 1 Per Cent Chromium-Molybdenum and Other Steels. F. J. Wilkinson and C. L. M. Cottrell. *Welding and Metal Fabrication*, v. 26, May 1958, p. 171-184.

Study of factors affecting hot cracking in weld made in SAE 4130 and other steels of similar composition by means of argon-shielded tungsten-arc process. Influence of sulphur, phosphorus and carbon content, grain size, microstructural conditions and heat treatment on crack sensitivity. Sulphur found to be major cause of cracking. Effect of sulphur increased by raising level of phosphorus. Increasing carbon content likewise reduced resistance to cracking by modifying effect of sulphur. 24 ref.  
(K9s, 2-60; AY, Cr, Mo)

**337-K.\*** Fusion Welding of Titanium in Jet-Engine Applications. H. W. Hofer. *Welding Journal*, v. 37, May 1958, p. 467-477.

Welding chambers, shielding equipment, welding variables and results obtained in joining commercially pure Ti and alpha-alloy and alpha-beta Ti alloys by inert-gas-shielded tungsten-arc and metal-arc processes. Problem of porosity and its relation to welding speed, weld chill and joint design. Control of weld embrittlement. Note on resistance welding. 5 ref.  
(K1d, K3; Ti-b, 7-51, 9-68)

**338-K.\*** Cracking Associated With Porosity in Titanium Welds Over 0.125 In. Thick. R. P. Olsen and J. Gates. *Welding Journal*, v. 37, May 1958, p. 478-483.

Inert-gas tungsten-arc welds were made in 0.125 and 0.18-in. sheet of titanium alloy containing 2 1/2% Sn and 5% Al. X-ray examination failed to reveal presence of microcracks demonstrated by metallographic investigation. Microhardness survey, chemical analysis, X-ray studies and metallographic examinations made to establish cause of cracks. Tensile loading of weld specimens revealed that inert-gas metal-arc process produced crack-free welds under conditions which resulted in cracking with tungsten-arc processes. (K1d, K9r, S13e; Ti-b, 9-72)

**339-K.\*** Spot Welding of Rail Steel. D. Canonico and H. Schwartzbart. *Welding Journal*, v. 37, May 1958, p. 484-488.

Results of survey of companies spot welding reroll rail steel to mild steel in the manufacture of their various products. Data on successfully used welding procedures. Three companies utilized pulsation welding to reduce severity of quench of the weldment. One company made no provision for slow cooling.  
(K3n; CN-g, CN-p, 4-57)

**340-K.\*** A Study of Factors Affecting the Strength and Ductility of Weld Metal. C. M. Wayman and R. D. Stout. *Welding Journal*, v. 37, May 1958, p. 193s-200s.

Effect of welding variables on mechanical properties of submerged-arc and inert-gas metal-arc welds in ingot iron, ASTM A212, and eutectoid steel. Variation in weld metal properties with preheating, travel speeds, welding current, number of

passes, energy input, cooling rate, heat treatment including annealing, normalizing, austenitizing, quenching and stress-relieving. Influence of base metal composition, restraint on weld metal and prestrain of weld metal on tensile properties. 65 ref.  
(K1d, K1e; CN-b, 2-64)

**341-K.\*** The Effects of Porosity on Mild-Steel Welds. William L. Green, Mahmoud F. Hamad and Roy B. McCauley. *Welding Journal*, v. 37, May 1958, p. 206s-209s.

Tensile bending and impact test used to measure effects of porosity on mechanical properties of welds made by submerged-arc and inert-gas metal-arc processes in AISI 1020 steel. Welds were inspected with X-ray. Results show that cross section of welds tested could be reduced by porosity up to about 7% without materially changing the mechanical properties.  
(K1d, K1e, K9r, 9-68; CN)

**342-K.\*** Cooling Rates and Peak Temperatures in Fusion Welding. Clyde M. Adams, Jr. *Welding Journal*, v. 37, May 1958, p. 210s-215s.

Derived relationships giving peak temperatures and centerline cooling rates directly as functions of geometric, thermal and welding variables. Expressions are close approximations derived from published temperature equation, usually active to within 5% and in accord with experimental findings. Factors determining whether heat flow is two or three-dimensional. 8 ref.  
(K1, K2, K9n, 2-61; ST, Al, 4-53)

**343-K.** Behavior of Welded Corner Connections. John W. Fisher, George C. Driscoll, Jr., and F. W. Schütz, Jr. *Welding Journal*, v. 37, May 1958, p. 216s-232s.

Tests on straight-corner connections for welded ridged portal frames. Connections proportioned using concepts of plastic analysis. Effect of member size on connections fabricated of large rolled steel sections. 9 ref.  
(K9r, 3-73, 4-57, 7-51, 17-51; ST)

**344-K.\*** High-Temperature Vacuum Brazing of Jet-Engine Materials. E. G. Huschke, Jr., and G. S. Hoppin. *Welding Journal*, v. 37, May 1957, p. 233s-240s.

Vacuum requirements for brazing; gas evolution of materials in vacuum; strength of vacuum brazed versus hydrogen brazed joint and alternate methods to vacuum brazing for representative superalloy containing small amounts of Ti and Al which form heavy nonreducible oxide films during hydrogen brazing. 6 ref. (K8j, 1-73, SGA-h, Co, Al, Fe, Ni, Ti)

**345-K.** (Dutch.) Welding of Metal Plate Laminated With PVC Foil (Marvi-Bond). M. Doucet. *Plastica*, v. 11, Mar. 1958, p. 178-181.  
(K1; Al-b, ST, 7-59)

**346-K.** (German.) Weldability of Steels for Engineering Structures. K. L. Zeyen. *Der Bauingenieur*, v. 32, 1957, p. 209-217, 420-428.

Weldability, welding suitability and welding safety. Proposals for the systematic classification of weldability specimens. Tests for determination of weldability with reference to choice of materials. Notch-resistant weld beads for preventing the propagation of brittle cracking. 96 ref. (K9r, K9s, ST)

**347-K.** Multiple Arc Multiplies Welding Speed. *American Machinist*, v.

106, June 16, 1958, p. 108-109.

(K1e)

**348-K. Aluminum Waveguide, Weld or Braze?** L. Virgile and J. Difazio. *Electronic Industries*, v. 17, Apr. 1958, p. 90-94.

(K8, K3; Al, Ti)

**349-K. Automatic Brazing Speeds Making of Coils for Carrier Corp.** Harry E. Miller. *Industrial Gas*, v. 36, Apr. 1958, p. 6-8.

(K8, T1b)

**350-K.\* New Vistas for Vinyl-Metal Laminates.** R. P. Hooker. *Machinery*, v. 64, June 1958, p. 99-103.

The laminates can be deep drawn, sheared, crimped, bent, punched and drilled. Thickness ranges from 0.004 to 0.02 in. Steel, aluminum or magnesium, 0.015 to 0.060 in. thick, form the backing. Preparing the backing and applying the vinyl; projection-welding technique employing magnetic force.

(K11d; ST, Al, Mg)

**351-K. Preliminary Investigation of the Tensile Properties of Beryllium Couplings.** J. Greenspan. Nuclear Metals, Inc. U. S. Atomic Energy Commission, NMI-1196, Dec. 11, 1957, 29 p. (Order from Office of Technical Services, Washington, D. C.) \$ .75.

Couplings include Be to Be, to Type 316 stainless, and to 2S aluminum. Beryllium in bolted or riveted joints was capable of considerable plastic deformation before fracture, but in brazed joints it was not. Beryllium as part of a threaded couple has good tensile strength, but little ductility. 6 ref.

(K13; T27; Be; SS, Al)

**352-K.\* Fusion Welding of Titanium.** C. A. Terry and E. A. Taylor. *Welding and Metal Fabrication*, v. 26, June 1958, p. 198-205.

Techniques used to make butt, billet, corner and lap welds in commercially pure Ti sheet from 0.028 to 0.125 in. thick.

(K-general; Ti-a, 4-53)

**353-K. Electronic Welding of Metals.** J. A. Stohr. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, TID-7546, p. 9-17.

It is possible to produce an impact area of fixed dimensions on an object placed in the path of an electron beam. On that area an amount of energy would be dissipated, depending on the number of electrons (current intensity) and their acceleration potential. Localization of the energy and the use of a vacuum account for improvements in welds not obtainable by other methods. Remarkable results obtained on refractory metals (W, Mo and Ta) or easily oxidizable metals (Zr, Be and U). (K6)

**354-K. Mechanism of Formation of Intercrystalline Cracks in the Heat Affected Zone in Fusion Welding.** B. I. Medovar. *Soviet Physics, Technical Physics*, v. 2, (1957), p. 1454-1457. (Translated by American Institute of Physics, Inc.)

Argues that there is a direct link between the composition of the molten weld metal and the appearance of cracks in the heat-affected zone of the solid base metal. 5 ref.

(K9, 9-72; ST)

**355-K.\* (German.) Oxy-Acetylene Welding of Cast Iron.** Hans Reininger. *Giesserei-Praxis*, v. 76, Mar. 25, 1958, p. 101-104.

Repair for welding minor defects. For best results preheating

is essential, but care should be taken to avoid structural changes and deterioration of mechanical properties due to heating. Composition of the material, design, shape or dimension of the object are important factors. (K2h, 18-72; CI)

**356-K. Can Preheat Replace Stress Relief?** H. Thomasson. *Canadian Metalworking*, v. 21, May 1958, p. 34-36.

Compares effects of preheating and stress-relief on properties of weldment. (K9p, K9q, J1a; 7-51)

**357-K. Adhesive Bonding of Titanium Alloy.** *Mechanical World and Engineering Record*, v. 138, June 1958, p. 277-278.

Procedures at Boeing Airplane Co. for bonding 6Al-4V Ti alloy to stainless steel honeycomb cores.

(K12; Ti, SS, 7-59)

**358-K. Adhesive Bonding.** Arnold Ruskin. *Michigan Technic*, v. 76, Feb. 1958, p. 28-30, 48, 52.

Review of bonding techniques and materials. 24 ref. (K12)

**359-K. Welding Aluminum and Its Alloys to Nuclear Standards.** N. T. Burgess. *Nuclear Power*, v. 3, May 1958, p. 215-216.

The argon-arc process using a tungsten electrode is most adaptable, being used over a range of thicknesses, automatically or manually, with or without filler rod.

(K1d, T11; Al)

**360-K. Welding Magnesium Alloys.** I. H. Morrison and A. F. Taylor. *Nuclear Power*, v. 3, May 1958, p. 217-218.

Argon-arc welding of Mg alloy cans for the Calder Hall reactor.

(K1d, T11g; Mg-b)

**361-K. Welding Techniques for the Rarer Metals.** D. R. Harries and J. G. Purchas. *Nuclear Power*, v. 3, May 1958, p. 219-221.

Properties and optimum methods of welding zirconium, columbium, beryllium and uranium. 19 ref.

(K-general, Zr, Nb, Be, U)

**362-K. Corrosion and Heat Resisting Steel Fabrication.** J. A. McWilliam. *Nuclear Power*, v. 3, May 1958, p. 222-223.

Welding of Cr-Ni steels.

(K-general; SS)

**363-K.\* Vacuum Welding by Electron Beam.** J. A. Stohr. *Nuclear Power*, v. 3, June 1958, p. 272-274.

Welding Zr, Al and other materials by means of a tungsten filament electron gun, which projects into a vacuum chamber. A thyatron controller chopper provides for intermittent cutting of the beam in case of strongly vaporizing metals.

(K6, 1-73; Zr, Al)

**364-K. Welding Copper-Base Alloy Tubes.** J. F. Sebald and L. H. Hawthorne. *Power*, June 1958, p. 108-111, 208-214, 218.

(K-general; 4-60; Cu)

**365-K. European Solder Developments.** M. Reininger. *Product Engineering*, v. 29, June 23, 1958, p. 97, 99. (From *Maschinenmarkt*, no. 92, Nov. 15, 1957.)

A survey of new solders and techniques. (K7; SGA-f)

**366-K.\* Welding Corrosion Resisting Steels of the 18-8 Cr-Ni Type and Heat Resisting Steels.** F. A. Ball. *Sheet Metal Industries*, v. 35, June 1958, p. 439-452.

The background of weld decay and the limitations of the methods developed for its prevention from

metallurgical viewpoint. Procedures for oxy-acetylene welding. 23 ref. (K2h, R-general; SS, 7-51)

**367-K. Brazing Filler Metals for High-Temperature Service.** A. M. Setapen. *Tool Engineer*, v. 40, June 1958, p. 119-120.

(K8; SGA-f)

**368-K.\* Titanium Welding Techniques.** Titanium Engineering Bulletin No. 6. Titanium Metals Corp. of America, 1958, 31 p.

Welding equipment, shielding arrangement, joint design, preparation and fit-up and recommended weld setting for both inert-gas-shielded metal-arc and inert-gas-shielded tungsten-arc welding processes. Data on stress-relieving; evaluation of weld quality; problems of porosity and cracking; procedure in producing typical weldments; equipment and procedures for spot welding titanium; evaluation of spot weld quality. (K-general; Ti)

**369-K. High-Temperature Adhesives.** C. N. Powis. *Aircraft Production*, v. 20, Mar. 1958, p. 88-92.

Developments in metal-to-metal bonding for conditions of high-speed flight. (K12)

**370-K. Cooperative Investigation of a New Welding Electrode for Stainless Steel.** R. D. Wylie. *American Society of Mechanical Engineers, Paper no. 58-MET-6*, Apr. 1958, 8 p.

New welding procedure for use in high-temperature steam piping. 15 ref. (K1a, W13h; SS)

**371-K. Welding Cast Components for Nuclear Power Application.** W. H. Rice. *American Society of Mechanical Engineers, Paper no. 58-MET-10*, Apr. 1958, 8 p.

(K1d, T11; SS)

**372-K. Fluxless Process Simplifies Aluminum Soldering.** Samuel Freedman. *Aviation Age*, v. 28, Mar. 1958, p. 126-129.

Technique developed by Chemalloy-Electronics. (K7e; Al-b)

**373-K. Spot Welding of Light Assemblies in Mild Steel.** *British Standards Institution*, B.S. 1140, 1957, 10 p.

(K3h; ST)

**374-K. Some Parameters Affecting Ceramic-to-Metal Seal Strength of a High Alumina Body.** Sandford S. Cole, Jr., and Frank J. Hynes, Jr. *Ceramic Bulletin*, v. 37, 1958, p. 135-138.

(K11b)

**375-K. Transparent Electrically Conductive Coating.** E. R. Olson and E. H. Lougher. *Electrical Manufacturing*, v. 61, Mar. 1958, p. 143-145, 318, 320.

New procedure for depositing a highly transparent, electrically conductive coating that may be applied at low temperatures. 5 ref. (K11a)

**376-K. Welding Joints in Steam Pipes.** N. P. Pienaar. *Engineer and Foundryman*, v. 22, Jan. 1958, p. 47-52.

Reliability of welds made by the new E.B. shielded-arc process. (K1d, W13h; ST)

**377-K. Effects of Oxidation on Adhesion of Polyethylene to Metals.** Frank J. Bockoff, E. Timothy McDonel and John E. Rutzler, Jr. *Industrial and Engineering Chemistry*, v. 50, June 1958, p. 904-907.

Small degrees of oxidation can considerably improve adhesion values. (K11d)

**378-K. Room Temperature-Cured Resorcinol Epoxide Adhesives for**

**Metals.** W. E. St. Clair and R. H. Moul. *Industrial and Engineering Chemistry*, v. 50, June 1958, p. 908-911.

9 ref. (K12; NM-d30)

**379-K.** Metal Surface Effects on Heat Resistance of Adhesive Bonds. J. M. Black and R. F. Blomquist. *Industrial and Engineering Chemistry*, v. 50, June 1958, p. 918-921.

Probable causes and mechanisms for the deterioration of adhesive bonds (phenol-epoxy type) in metal bonds at temperatures up to 550° F. 7 ref. (K12; NM-d30)

**380-K.** Adhesion Using Molecular Models. Adhesion of Polyethylene and Poly (Vinyl Chloride) to Metals. Dean Taylor, Jr., and John E. Rutzler, Jr. *Industrial and Engineering Chemistry*, v. 50, June 1958, p. 928-934.

Scale models of molecules of high polymers and metal surfaces—Ti, stainless steel and Fe—were prepared and fitted together and the adhesive force was calculated for various combinations. 30 ref. (K11d; Ti, SS, Fe)

**381-K.** Automatic Brazing in Production Line Speeds Coil Making. Harry E. Miller. *Industrial Heating*, v. 25, June 1958, p. 1144, 1146, 1148, 1150.

(K8; Cu, 4-53)

**382-K.** An Improved Method of Cleating. *Philips Technical Review*, v. 19, no. 9, 1957/1958, p. 268-269.

Cleat and tool designed in such a way as to result in a smaller tangential deformation. (K13)

**383-K.\*** New Method for Bonding Polyethylene to Rubber, Brass, and Brass-Plated Metals. H. Peters and W. H. Lockwood. *Rubber World*, v. 138, June 1958, p. 418-423, 426.

A new bonding process, which utilizes partially hydrogenated polybutadiene, now makes possible the direct adhesion of polyethylene to rubber, brass or brass-plated metals. The method produces bonds with tensile strengths up to 1000 psi. and peel strengths from 60-100 psi. (K11d; Cu-n)

**384-K.** (German.) General Survey of the Bonding of Metal. Artur Pohl. *Deutsche Eisenbahn Technik*, no. 3, Mar. 1958, p. 102-106.

21 ref. (K11, K12)

**385-K.** (German.) Vacuum Tight Metal-Ceramic Seals. Karl Ernst Müller. *ETZ Elektrotechnische Zeitschrift*, no. 3, Mar. 21, 1958, p. 69-71.

14 ref. (K11b)

**386-K.** (German.) Fluxing Material for Soldering of Aluminum and Its Alloys. *Technik und Betrieb*, no. 4, Apr. 1958, p. 61.

(K7; Al, RM-q)

## Cleaning Coating and Finishing

**473-L.\*** Problems in Simultaneous Heat-Hardening and Ceramic Coating of No. 420 Stainless Steel. Edward L. Bradley. *American Ceramic Society, Bulletin*, v. 37, May 1958, p. 222-226.

Problems encountered during efforts to simultaneously heat treat and porcelain enamel. The cooling contraction curve for the metal can be useful in determining the optimum softening point which its enamel coating should possess. (L27, J-general; SS)

**474-L.** Here's a Better Way to Prepare Metal for Enameling. *Ceramic*

*Industry*, v. 70, June 1958, p. 94-95.

System insures no carry-over of hard-to-rinse soil into the rinse and eliminates many rejects caused by the carry-over of a soapy film into the subsequent pickling, nickel dip, neutralizer and ground coat application operations. (L27, L12g)

**475-L.** Protection of Structural Steelwork in Chemical Plant. Mark Waghorn. *Corrosion Technology*, v. 5, Apr. 1958, p. 103-105.

Surface preparation by blast cleaning, flame cleaning or power tool cleaning. Classification of exposure conditions; suitable organic protective coatings. (L10, L26n, L26p, L26r; ST)

**476-L.** Neoprene and Hypalon for Chemical Plant Linings. C. H. J. Avons. *Corrosion Technology*, v. 5, Apr. 1958, p. 107-109.

(L26r, T29)

**477-L.** Hypalon Coatings. H. J. Lanning. *Corrosion Technology*, v. 5, Apr. 1958, p. 110-114.

(L26r)

**478-L.** The Protection of Vessels, Pipe Lines and Pumps With Neoprene Coatings. G. A. Curson. *Corrosion Technology*, v. 5, Apr. 1958, p. 115-116.

(L26r, T26q, T26r, W13d)

**479-L.** Epoxide Resins Versus Corrosion. L. M. Barakan and G. L. E. Wild. *Corrosion Technology*, v. 5, May 1958, p. 137-140.

9 ref. (L26p)

**480-L.** Properties and Applications of Cold-Cured Epoxy Resin-Based Coatings. *Corrosion Technology*, v. 5, May 1958, p. 141-142.

(L26p)

**481-L.** Epoxy Resins in Corrosion-Resistant Applications. P. A. Dunn. *Corrosion Technology*, v. 5, May 1958, p. 143-147.

(L26p)

**482-L.** Bitugel, New Anti-Corrosive Bitumen Composition. E. A. Duligal. *Corrosion Technology*, v. 5, May 1958, p. 152-155.

(L26a)

**483-L.** Decorative Etching and the Science of Metals. Cyril Stanley Smith. *Endeavor*, v. 16, Oct. 1957, p. 199-208.

13 ref. (L28, M20q, A2)

**484-L.** Determination of the Faradaic Impedance at Solid Electrodes and the Electrodeposition of Copper. J. O'M. Bockris and B. E. Conway. *Journal of Chemical Physics*, v. 28, Apr. 1958, p. 707-716.

(L17; Cu)

**485-L.** Factors Affecting Residual Stress in Electrodeposited Metals. Pt. 3. Joseph B. Kushner. *Metal Finishing*, v. 56, June 1958, p. 56-60.

A critical evaluation. (To be continued.) (L17, Q25h)

**486-L.\*** Modern Silver Plating Practice. Lawrence Greenspan. *Metal Finishing*, v. 56, June 1958, p. 61-63.

Best practice includes first striking in a solution of very much lower Ag content and high free cyanide content. For steel the established procedure is to use a double strike, first in a solution containing a lower Ag content and some copper cyanide, and second in a conventional strike solution. For the non-ferrous metals: brass, Cu, Ni and Ni alloys, only the second or conventional strike need be used. (L17; Ag)

**487-L.** Institute of Metal Finishing Holds 1958 Conference. R. Pinner. *Metal Finishing*, v. 56, June 1958, p. 66-71.

Held at Torquay, England, Apr. 15-19, 1958. Topics discussed included Ni and Cr plating, stress in metal deposits, porosity of electrodeposits. Informative abstracts provided. (L17, L-general)

**488-L.** Cleaning Stainless Work in the Plant. W. E. McFee. *Metal Products Manufacturing*, June 1958, p. 64.

(L-general, SS)

**489-L.** Mechanical Descaling and Drawing of Mild Steel Rod. Pt. 1. L. Marsden. *South African Engineer*, v. 49, Apr. 1958, p. 34-38.

(To be continued.) (L10e; ST, 4-55)

**490-L.** Process Upgrades Steel Parts. *Steel*, v. 142, June 9, 1958, p. 90-91.

Diffusing Cr into surface creates a hard case that resists wear, corrosion and oxidation. (L15; Cr, ST)

**491-L.** Platers Seek Better Tests. *Steel*, v. 142, June 9, 1958, p. 102, 105.

(L17c; Cr, Ni)

**492-L.** New Coating Process Gives Steel Drums Long Life. C. W. Schimpff. *Western Metalworking*, v. 16, May 1958, p. 57-59.

Centrifugal vinyl lining of steel drums, coupled with a high-temperature curing process, produces a uniform and improved lining to protect a variety of hard-to-package products. (L26p, W12c; ST)

**493-L.** (English.) Researches on Buffing. Yukio Tanaka. *Osaka University, Institute of Polytechnica, Journal*, v. 3, Mar. 1958, p. 27-34.

9 ref. (L10a; NM-j)

**494-L.\*** (French.) Effect of Metal on the Blistering of Powder Enamels in Thin Castings. Francois Danis. *Fonderie*, v. 147, Apr. 1958, p. 175-178.

If during the enameling operation a sufficient amount of free oxygen is present in the casting, the graphite will utilize this oxygen in preference to that of the enamel. This hypothesis is advanced to explain the blistering of enamel coatings on castings having a sufficient oxygen content. 5 ref. (L27; 5-60, 9-72)

**495-L.\*** (German.) Flame Cleaning of Blooms and Semifinished Materials. H. F. Habbig and A. Pfeuffer. *Schweiessen und Schneiden*, v. 10, Apr. 1958, p. 135-137.

Effect of flame cleaning on the structure of the treated materials; cracking and method of prevention. Further applications of the process. (L10g; 4-52)

**496-L.** (Italian.) Sandblasting of Metals as Preparation for Painting. T. A. Turco. *Vernici*, v. 14, Feb. 1958, p. 137-147.

33 ref. (L10c)

**497-L.\*** Priming Paints for Light Alloys. J. G. Rigg and E. W. Skerrey. *Institute of Metals, Journal*, v. 86, May 1958, p. 421-424.

At the end of a 10-year period, some of the paint systems on the light metals based on zinc chromate or zinc tetroxy-chromate primers require no more than cleaning or touching up. To a limited extent this is also true for paint systems based on iron oxide primers. Coatings based on red lead primer have not proved so useful. Zinc chromate and zinc tetroxy-chromate primer systems are preferred for composite structures of steel and light alloys. 4 ref. (L26n; EG-a39)

**498-L.** Roller Burnishing—a Low-Cost Method of Producing Smooth Surfaces. C. R. Morris. *Machinery*, v. 64, June 1958, p. 115-117.

(L10b, W2a)

- 499-L. Five Rules to Follow in Designing for Plating.** *Materials in Design Engineering*, v. 47, June 1958, p. 118-120.  
Design for uniform plate thickness; use smooth surfaces; provide for electrical contact; design for selective plating; provide for draining and venting. (L17, 17-51)
- 500-L. Multilayer Nickel Coatings.** *Metal Progress*, v. 73, June 1958, p. 95-96.  
Duplex and multiplex systems for Ni plating hold promise of giving bright plated work with better corrosion resistance. (L17; Ni)
- 501-L. Finishing Vauxhall Motor Cars.** *Product Finishing (London)*, v. 11, May 1958, p. 44-46, 49-51.  
(L-general, T21a)
- 502-L. Techniques for Canning and Bonding Metallic Uranium With Aluminum.** J. E. Cunningham and R. E. Adams. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 102-119.  
Use of an Al-Si alloy layer to retard interaction between Al and U and to promote the transfer of heat across the interface. A metallurgical bond can be achieved by dipping Al and U in the molten alloy; a thin adherent layer of the compound U(AlSi) is formed at the interface which acts as an effective diffusion barrier up to about 350° C. 10 ref. (L23, T11g; Al, U)
- 503-L.\* (Japanese.) Cladding Light Metals.** Eiichi Tanaka and Tadatsugu Yoshiki. *Light Metals (Tokyo)*, v. 8, Mar. 1958, p. 44-52.  
Cladding behavior of materials with different flow resistance. Good bonding can be obtained by hot rolling if the pair of metals is sufficiently reduced in the rolling pass. With hot extrusion, the inverted method is recommended. With cold rolling some cracking and rippling occurred. Bonding behavior improves with increasing individual thickness ratio, difference in hardness of outside material had no influence on cracking or rippling. Over-stretching of softer metal caused rippling which resulted in cracking of the harder metal. 6 ref. (L23; EG-a39, 9-72)
- 504-L. Skin-Polishing.** R. D. Edwards. *Aircraft Production*, v. 20, May 1958, p. 192-197.  
Large-scale chip-abrasion equipment for finishing Vickers Vanguard integral wing-skin panels. (L10b, 1-52, T24a)
- 505-L. Flame Plating. Process Provides Wear Resistant Surfaces on Metal Parts.** *Australasian Manufacturer*, v. 42, Apr. 5, 1958, p. 62-68, 71-72, 79, 80.  
(L29n)
- 506-L. Automation in Plating?** *Canadian Machinery*, v. 69, May 1958, p. 89-92.  
At Honeywell Controls, Scarborough, Ont. (L17, 18-74)
- 507-L. Savings in Stainless Clad Steel.** David T. Smith. *Chicago Purchaser*, v. 36, Jan. 1958, p. 63-67.  
Manufacture, properties and applications. (L22; SS, ST)
- 508-L. Pre-Treatment of Metal for Painting.** *Industrial Finishing (London)*, v. 10, May 1958, p. 26-27, 52.  
(L26, L10, L12)
- 509-L. Abstracts of Papers on Nickel Plating, Chromium Plating, Anodic Coatings and Coatings on Aluminum.** *Industrial Finishing (London)*, v. 10, May 1958, p. 29-36.  
(L17, L19; Ni, Cr, Al)
- 510-L. Sprayed Metal and Plastics Coatings.** G. H. Jenner. *Inspection Engineer*, v. 21, Nov.-Dec. 1957, p. 125-131.  
Discussion of metal powder and metal wire; methods of spraying and the various metals that can be coated by these methods. (L23; Al, Zn)
- 511-L.\* Improved Baths Solve Lifting of Plated Circuit Foils.** E. C. Rinker. *Iron Age*, v. 181, June 19, 1958, p. 118-120.  
Use of gold plating gives smooth, wear resistant finish, due to fine-grained preferentially oriented crystal structure. New bath, using inorganic stress reducers, makes rhodium deposit stresses compressive, rather than tensile, and eliminates lifting of the plating. (L17, T1c; Au, Rh)
- 512-L. Anodic Coatings.** *Mechanical World and Engineering Record*, v. 138, May 1958, p. 208-209.  
Applications of hard anodizing of Al alloys in the engineering and machine building fields. (L19q, 17-57; Al-b)
- 513-L. Electropolishing.** *Mechanical World and Engineering Record*, v. 138, June 1958, p. 274-275.  
Advantages over manual polishing. (L13p)
- 514-L.\* Alkaline Nickel Plating.** Edward B. Saubestre. *Plating*, v. 45, May 1958, p. 479-485.  
Uses equilibrium data for various complexing agents to calculate deposition potentials for Ni. Caustic and cyanide baths cannot be used for alkaline Ni plating; polyphosphates and ammonia are suitable inorganic complexing agents while dibasic carboxylic acids, alpha-hydroxy carboxylic acids, alpha-amino acids and amines are suitable organic complexing agents; examples of alkaline Ni solutions. 30 ref. (L17; Ni)
- 515-L.\* Research on Microthrowing Power and Leveling of Plating Baths.** Ernst Raub. *Plating*, v. 45, May 1958, p. 486-492.  
Structure, thickness and distribution of Cu and Ni electroplated on brass specimen with V-shaped notches, U-shaped notches and cylindrical test pieces to evaluate influence of shape on microthrowing power and leveling. Depth of notches ranged from 0.1 to 0.14 mm. and angles varied from 30 to 120°. Deposits were made from bright Ni proprietary bath, a Watts bath, cyanide Cu bath and sulphate Cu bath. 11 ref. (L17b; Cu-n, Cu, Ni)
- 516-L.\* Magnesium and Protective Coatings for Magnesium.** Harry A. Evangelides. *Plating*, v. 45, May 1958, p. 493-498.  
History of production of Mg and early chemical and anodic treatments for reducing corrosion. Process operating conditions for HAE coatings, pretreatment, post treatment, corrosion resistance and other characteristics. (L17; Mg, Cr)
- 517-L. Chromallized Steel.** Richard P. Seelig. *SAE Journal*, v. 65, May 1958, p. 42-44.  
Chromium diffuses into the base metal and combines to form an alloy case which is an integral part of the base metal. The case will not peel, spall, chip or flake off. (L15; ST, Cr)
- 518-L. The Effect of Lead in the Galvanizing Bath on the Ductility of Galvanized Coatings on Steel.** M. A. Houghton. *Sheet Metal Industries*, v. 35, June 1958, p. 453-458.  
(L18, Q23p, 8-65; ST, Zn, Pl, 4-53)
- 519-L. Ultrasonic Cleaning of Steel Strip.** *Sheet Metal Industries*, v. 35, no. 374, June 1958, p. 460-461.  
(L10f; ST, 4-53)
- 520-L. Pin Down Titanium Pickling Variables.** M. E. Komp and Dillon Evers. *Steel*, v. 142, June 23, 1958, p. 94-95.  
(L12g; Ti-b)
- 521-L. Water Glass Solves Heat Treat Problem.** *Steel*, v. 142, June 23, 1958, p. 100, 104.  
Coated on reactive metals like Ti and Zr alloys, it prevents embrittlement and scaling at high temperatures. (L27, J2, 8-67; Ti, Zr, 4-53)
- 522-L. High Vacuum Vapor Coating.** Theodore H. Crane. Paper from "1957 Conference", Society of Vacuum Coaters, p. 1-3.  
Relates poor adherence for texture of Al coatings to mean free path and other process variables in vapor coating. 5 ref. (L25g; Al)
- 523-L. Racking and Masking Techniques for Metallic Deposition by High Vacuum.** J. Gordon Seiter. Paper from "1957 Conference", Society of Vacuum Coaters, p. 4-8.  
(L25g, W3g)
- 524-L. Refrigerated Vacuum Pumping.** Howard Farrow. Paper from "1957 Conference", Society of Vacuum Coaters, p. 9-13.  
Requirements for refrigeration equipment to condense water from vacuum pumping system used in evacuating chamber for vacuum coating. (L25g, W10g)
- 525-L. Vacuum Deposition of Functional Coatings.** Chester Northrup and John Smith. Paper from "1957 Conference", Society of Vacuum Coaters, p. 14-17.  
Uses of vacuum evaporated coatings by optical and electronics industries. (L25g, T1, X3, 17-57)
- 526-L. Tungsten Filaments for Vacuum Metallizing.** Wilfrid G. Matheson and Ralph P. Ranger. Paper from "1957 Conference", Society of Vacuum Coaters, p. 18-25.  
Fundamental factors concerning design and use of W filaments as heat sources for evaporation process in vacuum metallizing. (L23, 1-73, X24f, 17-57; W, 4-61)
- 527-L. Lacquering Techniques for Vacuum Metallizing on Metals and Thermosetting Plastics.** Madison A. Self. Paper from "1957 Conference", Society of Vacuum Coaters, p. 26-30.  
(L23, 1-73, NM-d30)
- 528-L. (German.) Modern Wire Galvanizing Equipment.** Friedmund Rüb. *Draht*, v. 9, May 1958, p. 170-174.  
(L16, 1-52; Zn, 4-61)
- 529-L.\* (German.) Adhesiveness of Vitreous Enamel and Chemical Composition of Cast Iron.** Alexander Hauttmann. *Glaser*, v. 45, May 22, 1958, p. 301-304.  
Influence of saturation degree and of carbon, silicon, phosphorus, manganese and sulphur content studied by means of "double-T" test on 600 specimens; structural transformations of cast iron heated up to enameling temperature; optimal composition of cast iron. (L27, 2-60; CI)
- 530-L.\* (Russian.) Influence of Oxides on the Physical Properties of Steel Metallized Layers.** L. V. Krasnichenko and M. N. Schirzhenskii. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 137-141.

- During the process of electro-metallization, at the moment of fusion the metal becomes saturated with air. Particles of metal in the air current are spherical and vary greatly in size. The outside surface of these globules is covered with oxides. These oxides adversely affect the physical properties of the metallized layer. They can be greatly improved by proper heat treatment. 3 ref. (L23; ST)
- 531-L. Electroplating Applications of Quality Control.** W. E. Jones. *American Society for Quality Control, Transaction*, 1958, p. 339-350. Barrel plating case studies. (L17, S12)
- 532-L. Hard Facing in Practice.** C. V. Whitehouse. *Australasian Engineer*, Apr. 7, 1958, p. 66-73. Hard facing alloys and applications. (L24, L29n)
- 533-L. Cleaning and Pre-Treatment of Metal Surfaces.** *Australasian Manufacturer*, v. 42, Feb. 1, 1958, p. 60-64. (L12, L13, L14)
- 534-L. Surface Preparation of Metals Prior to Painting.** C. G. Robillard. *Chemical Industry and Engineering*, v. 10, Nov. 1957, p. 47-49. (L10, L12, L14)
- 535-L. Surface Preparation for Protective Linings and Coatings Used in Critical Service.** S. J. Oechsle, Jr., and K. G. LeFevre. *Engineers' Digest*, v. 18, Nov. 1957, p. 485, 514. (L10, L13, L26)
- 536-L. Porcelain Enamel—Corrosion Protection for Chemical Process Equipment.** *Industrial and Engineering Chemistry*, v. 50, June 1958, p. 75A-76A. (L27, R-general, T29)
- 537-L. Anodizing and Color Decorating Aluminum Products.** Donald Saffel. *Industrial Finishing*, v. 34, June 1958, p. 26-28, 30, 34, 36. (L19; A1)
- 538-L. Bell Helicopter's Finish; Something Very Special.** Fred Howard. *Industrial Finishing*, v. 34, June 1958, p. 38-40, 44. Newly developed lacquer covering has many desirable features. Cleaning and pretreatment on Al, Mg and steel; preparation for final paint and drying. (L26n, T24a; Al, Mg, ST)
- 539-L. Job Shop Painting With Electrostatic Spray.** Peter T. Spera. *Industrial Finishing*, v. 34, June 1958, p. 56-58, 60, 62. Applied to Al and Zn die castings. (L26; 5-61, Al, Zn)
- 540-L. New Finishing System for Office Furniture at Los Angeles Plant of Art Furniture Co.** *Industrial Heating*, v. 25, June 1958, p. 1195-1196, 1198, 1210. (L26n, L23, T10f; ST)
- 541-L.\* Phosphoric Acid Treatments for Steel. Pt. 1. The Nature of Coatings Produced by the Action of Phosphoric Acid on Steel.** M. Donovan, J. W. Scott and L. L. Shreir. *Journal of Applied Chemistry*, v. 8, Feb. 1958, p. 87-96. Coating composition changes with time of exposure to atmospheric oxygen. Role of oxygen in the reaction mechanism. 20 ref. (L14b; ST)
- 542-L. Oxidation of Iron Pretreated for Porcelain Enameling.** L. E. Fussell and R. L. Hadley. *Journal of American Ceramic Society*, v. 41, Mar. 1958, p. 81-88. The thickness of oxide layers formed on enameling iron at short times measured as a function of temperature to compare the effects of various pretreatments. 18 ref. (L14a, L27, R1h; Fe-a)
- 543-L. Hydrogen Treating Process for Steel.** J. H. Healy and J. D. Sullivan. *Journal of the American Ceramic Society*, v. 41, Apr. 1, 1958, p. 141-145. Steel is exposed to cathodically generated hydrogen until a decrease in density and an increase in porosity is obtained. Upon the removal of a substantial portion of the hydrogen, glass may be applied to the steel and it will be free of high and low-temperature hydrogen effects. This process permits the use of nonpremium steels, nonbubbly mill additions and ground-coat compositions that have greater corrosion resistance than conventional ground coats. 6 ref. (L27, P10m; ST, H)
- 544-L. Method of Boron Evaporation.** Akira Hashizume. *Journal of Scientific Research Institute*, v. 51, Dec. 1957, p. 211-214. Method of obtaining a boron layer by evaporation in which the necessity of temperature control is stressed. About 0.1 mg. per sq. cm. of boron layer is obtained by one run of evaporation on an Al disk 8 cm. in diameter to be used as the ionization chamber electrode. 4 ref. (L25; B)
- 545-L.\* A Progress Report. Porcelain Enamels on Aluminum.** Karl Kautz. *Metal Products Manufacturing*, v. 15, Apr. 1958, p. 63, 82, 90. Comments on Al alloys, mill additions, metal preparation, drying and firing. (L27; Al)
- 546-L. What's New in Vacuum Metallizing? Mill and Factory.** v. 62, Apr. 1958, p. 110-112. (L23, L25, 1-73)
- 547-L. Non-Metallic Plating of Aluminum.** John Starr. *Pacific Factory*, v. 88, Nov. 1957, p. 24-25. Ceramic coatings of great wear resistance now produced electrochemically. (L27; Al-b)
- 548-L.\* Now—Improved Corrosion Resistance for Plated Zinc Die Castings.** *Precision Metal Molding*, v. 16, July 1958, p. 39-42. Minimum porosity and stress-cracking of bright chromium plate about 0.03 to 0.08 mils thick is obtained at bath temperatures of around 130° F. and with ratios of chromic acid to sulphate of 120 to 1 to 175 to 1. (L17b, 9-68, 9-72; Zn, Cr, 5-61)
- 549-L. A Glossary of Barrel Finishing Terms.** *Precision Metal Molding*, v. 16, July 1958, p. 43-44. (L10d; 11-67)
- 550-L. Corrosion and Oxidation Resistant Coatings for Metals for Operation at Temperatures From 1000 to 2400° F.** John V. Long. *Society of Automotive Engineers, Preprint*, v. 46C, Apr. 1958, 14 p. (L15, L23, L27; SGA-g, SGA-h)
- 551-L. Cathode Processes in Electrodeposition of Thorium From Molten Electrolytes.** M. V. Smirnov and L. D. Yushina. *United Kingdom Atomic Energy Authority, AERE Lib/Trans*. 766, 1957, 11 p. The polarization of a Mo cathode has been studied at 600, 700 and 800° C. in a molten eutectic mixture of lithium and potassium chlorides. 28 ref. (L17; Th)
- 552-L. Inorganic Corrosion Inhibiting Coatings.** A. B. Smith and D. H. Gelfer. *University of Florida, Engineering Progress*, v. 1, Dec. 1957, p. 55-58. 4 ref. (L14, L26c, L23)
- 553-L\* Protective Metallic Coatings.** Charles L. Faust. Paper from "Metals for Supersonic Aircraft and Missiles". American Society for Metals, p. 170-201. High-temperature aircraft applications demand oxidation resistance; thermal stability; coefficient of thermal expansion relative to that of the basis metal; propensity for diffusion alloying with basis metal at the interface; properties of such a diffusion alloy zone relative to the performance needs; high melting point of the coating and of the diffusion alloy zone. Various types of metallic coatings analyzed. 18 ref. (L-general, T24, Q-general; SGA-h)
- 554-L. Effect of Contents of NaCN and NaOH in Zinc Plating Baths on the Mechanical Properties of Steels.** I. I. Moroz and N. T. Kudryatsev. *Metallovedenie i Obrabotka*, v. 4, Apr. 1958, p. 25-28. (Henry Brucher, Aladena, Calif., Translation no. 4184.) Increase in the NaCN and NaOH content of the Zn plating baths lowers the mechanical properties of two steels containing Mn, Si, Cr and Ni, as a result of penetration of hydrogen, which increases with concentration of cyanide in the solution and with plating time. (L17a; ST, Zn)
- 555-L. (French.) Surface Effects Encountered in the Electrolytic or Chemical Polishing of Some Metals.** D. Whitwham and P. Lelong. *Métaux Corrosion-Industries*, no. 391, Mar. 1958, p. 101-107. (L12f, L13p)
- 556-L. (German.) Graph-Type Calculations in Electroplating.** E. J. Adolf Stiasny. *Feinwerk Technik*, v. 62, Mar. 1958, p. 94-98. (L17c)
- 557-L. (German.) Mechanical Descaling of Sheets and Strip.** M. Reimann. *Industrie-Anzeiger*, v. 80, Mar. 21, 1958, p. 323-325. (L10g; 4-53)
- 558-L. (German.) Ultrasonics in Finishing.** Wilhelm Lehfeldt. *Schriftenreihe Feinbearbeitung*, no. 26, 1958, 82 p. Ultrasonic wave generation; ultrasonic cleaning; boring; deburring; welding. 92 ref. (L10f, G17d, K6r, 1-74)
- 559-L. (German.) Flame Cleaning.** Erich Theis. *VDI Zeitschrift*, v. 100, Mar. 21, 1958, p. 352. (L10g)
- 560-L. (Russian.) Gas Flame Metallization by Means of Fusion of the Surface Powder Layer.** L. V. Krasnichenko and M. M. Dubashinskii. *Vestnik Mashinostroenia*, May 1958, p. 70-71. (L23)
- 561-L. (Book.) Finishing Handbook and Directory.** I. S. Hallows, Ed. 501 p. 1958. Sawell Publications Ltd., 4 Ludgate Circus, London, E.C.4, England. (Free.) Cleaning processes, finishing processes, bibliography, glossary, labels, directories of equipment, trade names and associations. (L-general; 11-67)

562-L. (Book.) **Technical Papers Presented at 1957 Conference of the Society of Vacuum Coaters.** 33 p. 1958. Society of Vacuum Coaters, P.O. Box 3095, Cleveland 17, Ohio. \$10.

Papers abstracted separately. (L25g)

# Metallurgy

## Constitution and Primary Structures

306-M. **Structure of a New Series of MB<sub>12</sub> Compounds.** F. W. von Bat-chelder and R. F. Rauehle. *Acta Crystallographica*, v. 10, Oct. 1957, p. 648-649.

Crystal structures of V Be<sub>12</sub>, CrBe<sub>12</sub>, TaBe<sub>12</sub>, WBe<sub>12</sub>, MnBe<sub>12</sub>, FeBe<sub>12</sub> and CoBe<sub>12</sub> determined from single-crystal data. 7 ref. (M26; Be-b, 14-61)

307-M. **Structure of Steel.** Edwin Gregory and Eric N. Simons. *Edgar Allen News*, v. 37, Apr. 1958, p. 85-87.

Chromium, nickel and manganese alloys; Mn as an impurity. (To be continued.) (M27d; AY, Cr, Ni, Mn)

308-M.\* **Production of Dislocations During Growth From the Melt.** W. A. Tiller. *Journal of Applied Physics*, v. 29, Apr. 1958, p. 611-618.

The segregation of solute on a microscopic scale during crystal growth leads to the introduction of dislocation lines into the crystal at the bounding surfaces of the segregate. A layer type of segregate resulting from platelet growth leads to dislocation densities of 10<sup>9</sup> to 10<sup>8</sup> lines per sq. cm. A cellular type of segregation resulting from cellular or dendritic growth leads to dislocation densities of 10<sup>6</sup> to 10<sup>8</sup> lines per sq. cm. in the crystal. 29 ref. (M26b, N12)

309-M.\* **Orientation Study of Ultra-Thin Molybdenum Permalloy Tape.** P. K. Koh. *Journal of Applied Physics*, v. 29, Apr. 1958, p. 636-657.

Quantitative pole density stereograms of (111), (220), (200) and (113) poles of 1/8-mil Mo Permalloy tape were developed to establish its cold rolled deformation texture and annealed textures. (M26c, M23c, P16a, 2-64, 3-68; Fe, Ni, Mo, SGA-n)

310-M.\* **X-Ray Investigation of Perfection in Tin Whiskers.** H. G. Smith and R. E. Rundle. *Journal of Applied Physics*, v. 29, Apr. 1958, p. 679-683.

Tin whiskers with elasticities far above that of bulk Sn were examined for perfection by X-ray diffraction. Intensities were measured for several whiskers varying in diameter from 2 to 11μ. The observed structure factors were corrected for extinction according to the dynamical theory of X-ray diffraction with the crystallite size as a parameter and then compared to the calculated structure factors. The agreement with dynamical theory for imperfect crystals is very good, yielding a crystallite size of 1.5μ for a 5.5μ whisker and 2.7μ for whiskers of about 10μ in diameter. (M26n, M22g; Sn, 14-61)

311-M. **Evidence of Dislocation Jogs in Deformed Silicon.** William C. Dash. *Journal of Applied Physics*, v. 29, Apr. 1958, p. 705-709. (M26b, 3-68; Si)

312-M.\* **Polygonization of Copper.** F. W. Young. *Journal of Applied Physics*, v. 29, May 1958, p. 760-764.

Dislocations can be revealed as etch pits in Cu crystals doped with a small amount of Te. The progress of polygonization of such Cu after bending was followed with etch pits and X-ray diffraction. Climbing occurred at 500° C. and polygonization was complete after 2 hr. at 1000° C. In similar experiments with three samples of nominally 99.999% Cu, the one which was probably purest did not polygonize, while the other two did so. This indicates that if impurity is necessary for polygonization, only a very small amount is required. (M26n, M26b; Cu-a)

313-M. **Structures of Metals and Alloys.** Norman C. Baenziger. *Norelco Reporter*, July 10-17, 1957, p. 58, 72.

10 ref. (M25, M26)

314-M. **Electron Diffraction Study of the Epitaxial Growth of Silver Deposited on Some Single Crystals.** A. Pande. *Scientific and Industrial Research, Journal*, v. 17B, Jan. 1958, p. 1-5.

17 ref. (M22h, N3r; Ag, 14-62)

315-M.\* **Dilatational Strain Due to Lattice Defects in Copper.** Robert W. Keyes. *University of Chicago, Institute for the Study of Metals, 48th Quarterly Report*, Pt. 3, Mar. 1958, p. 53-57.

Determination of the lattice expansion per defect from certain simple models of the defects: numerical results for copper; estimation of the parameters of lattice defects. 8 ref. (M26s; Cu)

316-M. **Structure of Thallium and Gadolinium at Low Temperatures.** C. S. Barrett. *University of Chicago, Institute for the Study of Metals, 48th Quarterly Report*, Pt. 10, Mar. 1958, p. 131-133.

7 ref. (M27, 2-63; Tl, Gd)

317-M.\* (English.) **The Deformation Texture of Beta-Sn. Pt. 3. Derivation of Texture From Elements of Plastic Deformation.** Karel Toman and Marie Simerska. *Czechoslovak Journal of Physics*, v. 8, 1958, p. 233-245.

Theoretical derivation of compression and rolling textures in beta tin for two different sets of slip systems given in the literature. The textures derived theoretically were compared with the compression and rolling textures measured. The dependence of the texture produced on the temperature of deformation is explained. 14 ref. (M26c, Q24a; Sn)

318-M. (English.) **Crystal Structure Changes in the Tau-Phase of Aluminum-Copper-Nickel Alloys.** S. S. Lu and T. Chang. *Scientia Sinica*, v. 6, June 1957, p. 431-462.

13 ref. (M26; Al, Cu, Ni)

319-M. **Influence of Ultrasonic Waves in Investigating the Structure of Steels.** L. G. Merkurlov. *Soviet Physics, Technical Physics*, v. 2, 1957, p. 1282-1286. (Translation by American Institute of Physics, Inc.)

Ultrasonic waves can be successfully utilized not only for the purposes of determining defects in metals but also for studying the structure of metals; this includes, for example, the discovery of untempered structures in steels, the determination of the forging quality of parts, the measurement of the average grain size, etc. (M23, 1-74)

320-M. **Influence of Extinction on the Intensity of X-Ray Interferences in the Investigation of Steel.** E. L.

Galperin and Yu. S. Terminasov. *Soviet Physics, Technical Physics*, v. 2, 1957, p. 1276-1281. (Translation by American Institute of Physics, Inc.)

19 ref. (M21f, M26b; ST)

321-M. **Crystallography of Germanium.** G. Novak. *Soviet Physics, Technical Physics*, v. 2, 1957, p. 1544-1552. (Translation by American Institute of Physics, Inc.)

Goniometric examination gives a simple and rapid method of determining the orientation of germanium crystals from their external morphological features. Attempt to explain the tendency of single crystals and bicrystals of Ge to oriented growth in the Rubes contact method. 19 ref. (M26c, N3r; Ge)

322-M.\* (German.) **Contribution on Binary Systems of Titanium With Gallium, Indium and Germanium and of Zirconium With Gallium and Indium.** Kurt Anderko. *Zeitschrift für Metallkunde*, v. 49, Apr. 1958, p. 165-172.

Arc melting of alloys. Metallographic and radiographic studies. Preliminary phase diagrams of Ti-rich alloys of Ga and In. Estimation of structure of phase Zr<sub>3</sub>Ga. (M24b; Ti, In, Ge, Zr, Ga)

323-M.\* (German.) **Superstructure Phase of CsCl-Type in System Titanium-Molybdenum-Aluminum.** Horst Böhm and Karl Löhberg. *Zeitschrift für Metallkunde*, v. 29, Apr. 1958, p. 173-178.

Equilibria at 1000°. Description of the superstructure. Experiments on Ti alloys in which Mo was replaced by Nb or Ta and Al by Ga. Possible mechanism of superstructure formation. (M24c; Ti, Mo, Al, Nb, Ta, Ga)

324-M.\* (German.) **Ternary System Titanium-Vanadium-Zirconium.** Alexej Nowikow and Hans Günter Baer. *Zeitschrift für Metallkunde*, v. 49, Apr. 1958, p. 195-199.

Construction of isothermal section at 750° C. by the aid of metallographic and radiographic study. Marginal systems. Experimental method. Course of transformation in ternary system. Phase diagrams. (M24c; Ti, V, Zr)

325-M.\* **Note on a Redetermination of the Aluminum-Gallium Equilibrium Diagram.** J. W. H. Clare. *Institute of Metals, Journal*, v. 86, May 1958, p. 431-432.

Thermal analysis was used to establish the form of the diagram. The system was found to consist of a simple eutectic with a eutectic temperature of 26.6° C.; the eutectic composition was not established. Metallographic and X-ray examination confirmed the existence of only two phases—Al and Ga. A tentative solidus was established down to 300° C. by a metallographic examination of annealed and quenched alloys. 4 ref. (M24b; Al, Ga)

326-M.\* **Use of Thermal Expansion Measurements to Detect Lattice Vacancies Near the Melting Point of Pure Lead and Aluminum.** R. Feder and A. S. Nowick. *Physical Review*, v. 109, Mar. 15, 1958, p. 1959-1963.

Dilatometric and X-ray measurements of thermal expansion. For lead, results obtained by the two techniques agree within experimental error, which is interpreted to imply that the vacancy concentration at the melting point is 1.5 x 10<sup>-4</sup>. For aluminum, dilatometric

expansion appears to be slightly greater than X-ray expansion. If this discrepancy is real, it corresponds to a vacancy concentration at the melting point of Al of about  $3 \times 10^{-4}$ . The corresponding estimate for the formation energy of a vacancy in lead is 0.53 eV, and in Al, 0.77 eV. 26 ref. (M26s, M21f, M23b, P11g; Pb-a, Al-a)

**327-M.\* The Crystallographic Aspect of the Mechanical Twinning in Ti and Alpha-U.** Hiroshi Kiho. *Physical Society of Japan, Journal*, v. 13, Mar. 1958, p. 269-272.

It was found that {1122} and {1124} twins in Ti are reciprocal to each other and that the elements of {1121} twin are in agreement with Hall's result. 10 ref. (M26c, Q24b; Ti, U)

**328-M.\* Magnetic Effects on the Electron Diffraction Patterns From a Cobalt Crystal.** M. Blackman and E. Grunbaum. *Physical Society, Proceedings*, v. 71, May 1, 1958, p. 758-760.

Electron diffraction patterns taken on the prism face to a cobalt crystal showed a distortion due to the magnetic leakage field. The normal diffraction spots were replaced by a series of areas. When the primary beam was moved parallel to the edge of the crystal, the distorted pattern changed with a period characteristic of the domain spacing. On heating the crystal the magnitude of the distortion decreased, and became negligible at about 250° C. (M22h, M26n, P16; Co)

**329-M.\* (French.) Metallographic Study of Nickel and Nickel Alloys by Means of Local Polishing and Replica Techniques.** Pierre A. Jacquet. *Revue du Nickel*, v. 24, Jan-Feb-Mar. 1958, p. 1-10.

Use of electrolytic buffer for local polishing and etching, plus replicas such as made with nitrocellulose product called "Replic" (either plain or with sprayed-on aluminum film which provides greater reflective power), greatly facilitates nondestructive testing of parts at all stages of fabrication, as well as laboratory specimens. Results on Cr-Ni stainless steels and heat resistant alloys, Monel, annealed 70-30 cupro-nickel, nickel-clad steel and Nimonic alloys. 15 ref. (M20; Ni, SS)

**330-M. (Japanese.) Electrolytic Polishing of Aluminum and Aluminum-Copper Alloy for Investigation of Microstructures.** Takuichi Morinaga, Yoshikazu Hosoi and Eiichi Sawato. *Light Metals (Tokyo)*, v. 8, Mar. 1958, p. 9-13.

(M27, M20p; Al, Cu)

**331-M.\* (Japanese.) Effect of Manganese and Chromium on the Characteristics of Aluminum-Magnesium (3-5%) Alloys.** Pt. 4. Rihel Kawachi. *Light Metals (Tokyo)*, v. 8, Mar. 1958, p. 34-43.

Mechanical properties and macrostructure of Al alloy with 3 to 5% Mg, 0 to 0.75% Mn and 0 to 0.5% Cr, extruded at 1000 tons pressure to 4x40x40-mm. angle section. Mn and Cr bring about fibrous structure in the section; tensile properties are influenced by amount of fibrous structure and grain size; Mn, Mg, Cr increase strength; Mn and Cr decrease elongation. Properties may be considerably influenced by extruding temperature

and preheating of ingot. (M27, Q27, 2-60; Al, Mn, Mg, Cr)

**332-M. (Russian.) Properties of Atoms in Alloys of Transition Elements.** I. Ya. Dekhtyar. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 17-22.

Investigation of the magnetic characteristics of alloys of transition elements appears to be one of the methods for learning their electronic structure. Macroscopic values are obtained, but the characteristics of individual atoms cannot be determined by this method. Neutronographic analysis yields information on the structure of the electronic envelope of single atoms by evaluating disseminated neutrons. This mathematical consideration suggests further study by other means. 9 ref. (M25, P16)

**333-M. An Investigation of the Me-Si-MeSi Region of the Mn-Fe-Si and Some Related Systems.** Bertil Aronsson. *Acta Chemica Scandinavica*, v. 12, no. 2, 1958, p. 308-313.

22 ref. (M24c, M22g)

**334-M.\* Studies of Aluminum-Rich Alloys With the Transition Metals Manganese and Tungsten. Pt. 1. The Crystal Structure of  $\epsilon$ (W-Al)-WAl.** J. A. Bland and D. Clark. *Acta Crystallographica*, v. 11, Apr. 10, 1958, p. 231-236.

The crystal structure of WAl has been determined with moderate accuracy. The space-group symmetry was found to be Cm, and precision lattice parameters were measured. The heavy atom technique was used to find the approximate structure, and  $F_0$  syntheses were used in the refinement. The atomic arrangement is non-centrosymmetrical. 10 ref. (M26g; Al, Mn, W)

**335-M. Studies of Aluminum-Rich Alloys With the Transition Metals Manganese and Tungsten. Pt. 2. The Crystal Structure of  $\delta$ (Mn-Al)-MnAl.** J. A. Bland. *Acta Crystallographica*, v. 11, Apr. 10, 1958, p. 236-244.

Crystals of the triclinic alloy phase  $\delta$ (Mn-Al) with an ideal formula MnAl<sub>11</sub> have been isolated from a ternary melt containing Zn. 19 ref. (M26g; Al, Mn, W)

**336-M.\* The Twist in a Crystal Whisker Containing a Dislocation.** J. D. Eshelby. *Philosophical Magazine*, v. 3, May 1958, p. 440-447.

The twist due to a screw dislocation parallel to the axis of an isotropic cylinder of arbitrary cross section can be found from the solution of the ordinary torsion problem for the same cylinder. Some particular cases are worked out. Results are also valid for certain kinds of anisotropy. 13 ref. (M26b; 14-61)

**337-M.\* Density Changes of Crystals Containing Dislocations.** A. Seeger and P. Haasen. *Philosophical Magazine*, v. 3, May 1958, p. 470-475.

Zener's theory of the volume expansion of self-strained elastic bodies is applied to screw and edge dislocations in isotropic media. The important physical parameters entering are the pressure dependence of the shear modulus, and to a lesser extent, that of the bulk modulus. Numerical results for a number of materials. 13 ref. (M26b, P10a)

**338-M. Chemical Bonding in Bismuth Telluride.** J. R. Drabble and C. H. L. Goodman. *Physics and*

*Chemistry of Solids*, v. 5, no. 1/2, 1958, p. 142-144.

7 ref. (M25h; Bi, Te)

**339-M. The Structure of Metals as Seen Under the Microscope.** Cyril Stanley Smith. *Royal Institution of Great Britain, Proceedings*, v. 36, Pt. 2, no. 163, 1957, p. 404-416.

(M21)

**340-M.\* Etching of Germanium and Silicon.** Pei Wang. *Sylvania Technologist*, v. 11, Apr. 1958, p. 50-58.

An oxidizing agent and a complexing agent are needed. By varying the etchant, the etching conditions and techniques, different surfaces can be obtained for various purposes. Chemistry of etched Ge surfaces and their relation to device characteristics. 43 ref. (M20q; Ge, Si)

**341-M. Uranium-Zirconium Alloys.** *Soviet Journal of Atomic Energy*, v. 3, 1957, p. 957-958. (Translation by Consultants Bureau, Inc.)

Presence of  $\epsilon$ -phase is firmly established in experiments on the diffusion of vapor from a U ingot placed in a Zr cylinder, carried out below the stability temperature of a solid solution of U in beta Zr. Metallographic evidence of the stability of the  $\epsilon$ -phase was obtained by annealing a specimen (50% U by weight) of cold worked and recrystallized  $\epsilon$ -phase in a furnace having a temperature gradient. 4 ref. (M24b; U, Zr)

**342-M. X-Ray Study of the Elongation of Irradiated Uranium Rods.** I. V. Batenin and E. V. Sharov. *Soviet Journal of Atomic Energy*, v. 3, no. 9, 1957, p. 1047-1049. (Translation by Consultants Bureau, Inc.)

CuK $\alpha$  radiation was used in apparatus for the roentgenography of highly radioactive materials. The specimens were rods of natural and 2% enriched U. (M26c, P10d; U, 14-70)

**343-M. Changes in X-Ray Line Intensities on Deforming Polycrystals.** B. I. Smirnov. *Soviet Physics, Technical Physics*, v. 2, no. 1, 1957, p. 193-194. (Translation by American Institute of Physics, Inc.)

9 ref. (M21f, M26s)

**344-M.\* (Russian.) Investigation of the Effect of Mutual Orientation of Crystals on Fluidity in Intercrystalline Linking Phenomenon.** V. I. Arkharov and A. A. Pen'tina. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 68-73.

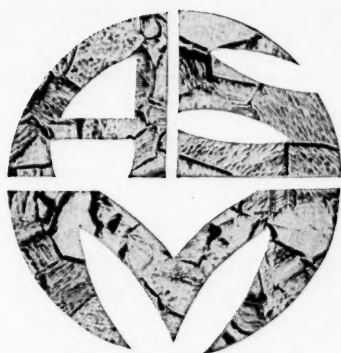
Effect of internal adsorption and diffusion of impurities along individual grain boundaries. Intercrystalline linking and liberated energy depend on the character of mutual orientation. 19 ref. (M27f, M26, 3-69)

**345-M.\* (Russian.) Radiographic Investigation of the Distribution of Carbon in Iron Alloys.** A. S. Zav'yalov and B. I. Bruk. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 127-136.

Iron alloys containing Cr, Mn, Ni, Si and Mo were investigated using carbon<sup>14</sup> to obtain autoradiographs. Method found reliable for determining the character of mutual bond between the distribution of carbon resulting from various heat treatment and the alloying elements. 18 ref. (M23q, 2-64; Fe-a, C)

**346-M.\* The Structure of Steel.** Edwin Gregory and Eric N. Simons.

The  
13th



## Metallographic Exhibit

Cleveland, Ohio, October 27 to 31, 1958

*All metallographers—  
everywhere—  
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Classification of entry.

Material, etchant, magnification.

Any special information as desired.

The name, company affiliation and postal address of the exhibitor should be placed on the *back of the mount* together with a request for return of the exhibit if so desired.

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**Metallographic Exhibit  
American Society for Metals  
7301 Euclid Ave.  
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### CLASSIFICATION OF MICROS

Class 1. Cast irons and steels.

Class 2. Carbon and alloy steels (wrought).

Class 3. Stainless steels and heat resisting alloys.

Class 4. Aluminum, magnesium, beryllium, titanium and their alloys.

Class 5. Copper, nickel, zinc, lead and their alloys.

Class 6. Uranium, plutonium, thorium, zirconium and reactor fuel and control elements.

Class 7. Metals and alloys not otherwise classified.

Class 8. Series showing transitions or changes during processing.

Class 9. Welds and other joining methods.

Class 10. Surface coatings and surface phenomena.

Class 11. Slags, inclusions, refractories, cermets and aggregates.

Class 12. Electron micrographs.

Class 13. Results by unconventional techniques.

Class 14. Color prints in any of the above classes. (No transparencies accepted.)

### AWARDS AND OTHER INFORMATION

A committee of judges will be appointed by the Metal Congress management which will award a First Prize (a medal and blue ribbon) to the best in each classification. Honorable Mentions will also be awarded (with appropriate medals) to other photographs which in the opinion of the judges closely approach the winner in excellence. A Grand Prize, in the form of an engrossed certificate and a money award of \$500 from the Adolph I. Buehler Endowment will also be awarded the exhibitor whose work is judged best in the show, and his exhibit shall become the property of the American Society for Metals for preservation and display in the Society's national headquarters in Cleveland.

All prize-winning photographs will be retained by the Society for one year and placed in a traveling exhibit to the various Chapters.

# 40th NATIONAL METAL CONGRESS & EXPOSITION

CLEVELAND PUBLIC AUDITORIUM — — — OCTOBER 27 THRU 31, 1958

Edgar Allen News, v. 37, Mar. 1958, p. 53-55.

Crystalline forms, grain size, structural forms and changes, impurities. (M26, M27; ST)

**347-M.** New Opinions on Grinding and Polishing, Especially of Metallographic Specimens. Z. Ministr. Industrial Diamond Review, v. 18, Feb. 1958, p. 26-28.

16 ref. (M20p)

**348-M.** Panoramic View of Microstructure Possible by New Technique. Industrial Heating, v. 25, June 1958, p. 1222, 1224.

Giant lantern slides from photomicrographs for study of refractories. (M21, M27, RM-h)

**349-M.** Three Methods of Specimen Preparation for Selected Area Electron Diffraction Examination of Metal Film Coated Ceramic Oxide Sub-Micron Particles. Arthur E. Lucier. North Carolina State College, Engineering School Bulletin, no. 64, Feb. 1958, p. 3-15.

5 ref. (M22h, 1-60; NM-f, 14-62)

**350-M.** Electron Diffraction From Crystals Containing Stacking Faults. Pt. 2. M. J. Whelan and P. B. Hirsch. Philosophical Magazine, v. 2, Nov. 1957, p. 1303-1324.

Electron optical experiments on thin foils of stainless steel are in good agreement with theory. 7 ref. (M22h, M26s; SS, 4-56)

**351-M.** Indium-Rich Indium-Magnesium and Indium-Lithium Alloys. J. Graham and G. V. Raynor. Philosophical Magazine, v. 2, Nov. 1957, p. 1354-1363.

For comparison with the results obtained from alloys of indium with solute metals from Group IIB of the periodic table, the lattice spacings of In-Mg and In-Li alloys are measured. 11 ref. (M24b, M26; In, Mg, Li)

**352-M.** Band Structure of the Transition Metals. N. F. Mott and K. W. H. Stevens. Philosophical Magazine, v. 2, Nov. 1957, p. 1364-1386.

45 ref. (M25, P15, P16; Cr, Fe, Co, Ni)

**353-M.\*** The Theory of Small Angle Scattering From Dislocations. H. H. Atkinson and P. B. Hirsch. Philosophical Magazine, v. 3, Mar. 1958, p. 213-228.

Small angle scattering of X-rays or neutrons from crystals containing a random network of dislocations is calculated. Three causes of density changes associated with dislocations are: that due to the elastic strain field from edge dislocations, that due to second-order elasticity effects and that due to the dislocation cores. 17 ref. (M26b, M22)

**354-M.** Measurement of Lattice Vibrations in Vanadium by Neutron Scattering. C. M. Eisenhauer, I. Pelah, D. J. Hughes and H. Palevsky. Physical Review, v. 109, Feb. 15, 1958, p. 1046-1051.

(M26; V)

**355-M.** X-Ray Study of Deuteron-Irradiated Copper Near 10° K. R. O. Simmons and R. W. Balluffi. Physical Review, v. 109, Feb. 15, 1958, p. 1142-1152.

Measurements of lattice expansion using a rotating single crystal method. (M26, 2-67; Cu)

**356-M.** Phase Diagram of Bismuth to 130,000 Kg/Cm<sup>2</sup>, 500° C. F. P. Bundy. Physical Review, v. 110, Apr. 15, 1958, 314-318.

(M24a; Bi)

**357-M.\*** Electrical Methods for Determining the Positions of Dislocation Regions in Germanium. C. A. Hogarth and A. C. Baynham. Physical Society Proceedings, v. 71, Apr. 1, 1958, p. 647-653.

Walls of edge dislocations which exist in Ge crystals grown on a deformed seed are regions of high electrical conductivity in both n and p-type samples. By simple plotting of potential against distance at constant current or from point-contact rectification measurements the positions of such dislocation walls may be located, the results agreeing with the positions determined by etch pit examination of the surfaces at which dislocations emerge. Evidence of the p-type character of dislocations in n-type Ge is presented. 9 ref. (M26b, M23s; Ge)

**358-M.** Attempt to Determine Electron Configurations in Aluminum-Rich Alloys of Transition Metals. P. J. Black and W. H. Taylor. Reviews of Modern Physics, v. 30, Jan. 1958, p. 55-58.

6 ref. (M25m; Al-b)

**359-M.** Vibration Spectra of Vanadium and a Mn-Co Alloy by Neutron Spectrometry. A. T. Stewart and B. N. Brockhouse. Reviews of Modern Physics, v. 30, Jan. 1958, p. 250-255.

13 ref. (M22, P-general; Co, Mn, V)

**360-M.** Macrostructural Examination of Cast Uranium Bars. B. W. Mott and H. R. Haines. United Kingdom Atomic Energy Authority Research Group, AERE, M/R 509, 1958, 12 p.

Method of etching uranium sections to reveal the macrostructure; examination of sections from various cast bars 1.0 and 1.4 in. diameter. (M28p, M20q; U, 4-55)

**361-M.** Absorption and Diffusive Scattering of Ultrasonic Waves in Metals. L. G. Merkulov. Soviet Physics, Technical Physics, v. 2, 1957, p. 953-957. (Translation by American Institute of Physics, Inc.)

Experimental investigations show that ultrasonic waves can be successfully employed for determining the average grain size in a metal. Method is based on measurement of the attenuation of ultrasonic waves. (M27c, 1-74)

**362-M.** Structure of Superconductors. Pt. 9. Investigation of Alloys of Bismuth With Platinum, Ruthenium, Osmium and Iridium. N. N. Zhuravlev and L. Kertes. Soviet Physics JETP, v. 5, Dec. 15, 1957, p. 1073-1078. (Translation by American Institute of Physics, Inc.)

The compound BiPt crystallizes in two modifications, alpha and beta. The appearance and disappearance of superconductivity may be explained by the presence of the beta high-temperature modification. Bismuth does not form compounds with ruthenium, osmium or iridium by direct alloying. 17 ref. (M26q, P15g, 2-63; Bi, Pt)

**363-M.** Structure of Superconductors. Pt. 10. Thermal, Microscopic and X-Ray Investigation of the Bismuth-Palladium System. N. N. Zhuravlev. Soviet Physics JETP, v. 5, Dec. 15, 1957, p. 1064-1072. (Translation by American Institute of Physics, Inc.)

A more accurate determination of the phase composition of alloys containing 43-54% Pd; behavior of these alloys at low temperatures. 13 ref. (M24b, P15g; Bi, Pd)

**364-M.** Phase Diagram for Cerium. A. I. Likhter, Iu. N. Riabinin and L. F. Vereshchagin. Soviet Physics JETP, v. 6, Mar. 1958, p. 469-471. (Translation by American Institute of Physics, Inc.)

The p-T diagram of 99.8% pure cerium measured from -150 to +100° C. over a pressure interval up to 12,000 kg. per sq. cm. In the p-T plane the phase equilibrium line is a straight line whose slope is 43 kg. per sq. cm. per °C. The transition at atmospheric pressure and low temperature is the same as at room temperature and high pressure. 6 ref. (M24a, Ce-a)

**365-M.** Chemical Nature of the Ternary Intermetallic Phases in the Magnesium-Copper-Zinc and Magnesium-Copper-Nickel Systems. V. I. Mikheeva and G. G. Babayan. Academp of Sciences of the USSR. Proceedings, v. 109, July-Aug. 1956, p. 475-476. (Translation by Consultants Bureau, Inc.)

8 ref. (M24c; Cu, Mg, Ni, Zn)

**366-M.** (English.) The Crystal Structure of Iridium Diselenide. Luisa Brahe Baricelli. Acta Crystallographica, v. 11, Feb. 10, 1958, p. 75-79.

7 ref. (M26q; Ir, Se)

**367-M.\*** (English.) The Phase Diagram of Cu-Si-Zn Alloy. Genjiro Mima and Masaharu Hasegawa. Osaka University, Technology Reports, v. 6, Oct. 1956, p. 313-321.

Reactions on solidification of the Cu-Si-Zn ternary alloys investigated by thermal analysis and microscopic observation; liquidus surface determined except near Si. 5 ref. (M24c; Cu, Si, Zn)

**368-M.** (Chinese.) Ordering and Vacancy Diffusion in AuCu. Sze Shih-Yuan. Acta Physica Sinica, v. 13, July 1957, p. 245-251.

11 ref. (M26b, M26c, N1e; Au, Cu)

**369-M.** (German.) Examination of Metal Structures at High and Low Temperatures. Pt. 1-2. Premysl Rys, Ladislav Bezdek, Karel Cihla, Dalibor Ruzicka and Jiri Skarek. Acta Technica, 1958, p. 58-83, and 85-119.

37 ref. (M21; ST)

**370-M.** (German.) Investigation of Friction Pyrophoric Ti-Alloys; Ti<sub>2</sub>Bi, a New Type of Structure. Helga Auer-Welsbach, H. Nowotny and A. Kohl. Monatshefte für Chemie, v. 89, Mar. 21, 1958, p. 154-159.

(M24, M26q, Q9p; Ti-b)

**371-M.** (German.) Disintegration Curve and Critical Point of the System Gold-Nickel. A. Münster and K. Sagel. Zeitschrift für Physikalische Chemie, v. 14, Mar. 1958, p. 296-305.

24 ref. (M24b; Au-b, Ni-b)

**372-M.** (Rumanian.) Application of Temperature Spectra as a New Method for the Study of Matter. Some Results for Iron and Steel. Maria Bolgiu. Studii si Cercetari de Metalurgie, v. 2, no. 4, 1957, p. 415-424.

New method of thermodifferential analysis. The thermocouple junction in vacuum, taken as standard, is situated in the immediate neighborhood of the junction soldered to the specimen. The difference in temperature between the vacuum and specimen junctions is then determined only by specimen temperature variations. By optical recording and suitable amplification diagrams of the temperature difference as a function of the vacuum junction temperature, so-called "tem-

perature spectra", are obtained that reveal the state of the specimen. 6 ref. (M23r; Fe, ST)

373-M. (Russian.) **Metallographic Study of Influence of Various Temperatures on Deformation of Aluminum Monocrystals.** L. I. Vasil'ev. *Scientia Sinica*, v. 7, Jan. 1958, p. 45-57.

17 ref. (M26s, Q24, 2-61; Al)

## Transformations and Resulting Structures

273-N.\* **Carbide Precipitation in Several Steels Containing Cr and V.** Arun K. Seal and R. W. Honeycombe. *Iron and Steel*, v. 31, May 21, 1958, p. 221-225.

Behavior of an alloy steel on tempering depends primarily on the behavior of the carbide dispersion which is formed. While high-chromium steels do not normally show a secondary hardening peak, secondary hardening or more strictly maintenance of primary hardening does occur because of the presence of Cr-C. Comparison of this behavior with that of a 1% V steel (in which V<sub>2</sub>C<sub>3</sub> is the effective precipitate) leads to the conclusion that the various alloy carbides differ in their effects partly because of differences in their tendency to remain as a fine dispersion. (N8a, N7; AY, Cr, V)

274-N.\* **Creep-Resistant Steels. Effects of Tempering on Some Types Containing Cr, Mo and V.** E. Smith and J. Nutting. *Iron and Steel*, v. 31, May 21, 1958, p. 226-235.

Microstructural changes occurring during the tempering of a series of 0.2% C steels containing up to 3% Cr, 1% V and 1% Mo. Hardness determined, microstructures examined by electron microscope. Attempt to identify the precipitated carbides by electron diffraction examination of the carbides on the extraction replicas. (N8a; AY, Cr, Mo, V)

275-N.\* **Low-Carbon Bainitic Steels.** K. J. Irvine and F. B. Pickering. *Iron and Steel*, v. 31, May 21, 1958, p. 235-247.

Retardation of the normal polygonal ferrite formation is achieved most successfully with a ½% Mo-B base composition, and can also be obtained with 1% W-B. It is also possible to use a boron-free higher alloy composition containing at least 0.3% Mo. The steel transforms over a wide range of cooling rates to bainitic ferrite, which has superior mechanical properties to polygonal ferrite, mainly because of a much finer grain size. Grain size is controlled by the transformation temperature, which can be lowered by the addition of alloying elements. (N8m, 2-60; AY)

276-N.\* **The Metallography of Low-Carbon Bainite Steels.** K. J. Irvine and F. B. Pickering. *Iron and Steel*, v. 31, May 21, 1958, p. 247-255.

A relationship was obtained between tensile strength, transformation temperature and structural features. At high transformation temperatures (the lower tensile-strength level), the strength is largely controlled by grain size and, as the transformation temperature decreases, the grain size decreases and the tensile strength increases. From a detailed examination of the isothermal transformation characteris-

tics, a mechanism can be suggested for the formation of low-carbon bainitic structures. The main feature of this reaction is that bainitic ferrite nucleates by a shear mechanism and carbon diffuses away from the growing ferrite plate. (N8, Q27a; CN-g)

277-N.\* **Vanadium and Molybdenum Steels. Effect of Ta and Nb on Tempering.** Arun K. Seal and R. W. K. Honeycombe. *Iron and Steel*, v. 31, May 21, 1958, p. 256-263.

Small additions of the strong carbide-forming elements Ta and Nb were made to steels of simple basic composition in which V<sub>2</sub>C<sub>3</sub> and Mo<sub>2</sub>C were the predominant alloy carbides in the tempering range in which secondary hardening occurs. TaC and NbC possess very high melting points, and thus promote stability in carbide phases with which they form solid solutions. Extent to which these additions influence the stability of the carbide precipitates, and the consequent effect on the secondary hardening phenomenon. (N8a, N8r; AY, V, Mo, Ta, Nb)

278-N.\* **Transformation Characteristics. Variations Within Samples of an Alloy Steel.** W. Steven and D. R. Thorneycroft. *Iron and Steel*, v. 31, May 21, 1958, p. 274-284.

Transformation characteristics of 9-gage wires, derived from the top, middle and bottom of 1½-ton ingots of B.S. En 24 steel, were not markedly different, the greatest difference between transformation times being of the order 2X. Longitudinal and transverse variations in hardenability that existed within the ingot and between the three sizes of material are due to variations in the intensity of microsegregation of the principal alloying elements Ni, Cr, Mn and possibly of Mo and P. (N12, N8, J5, 2-60; AY)

279-N.\* **Aging of Pure Iron After Heat Treatment.** P. G. Morgan. *Iron and Steel*, v. 31, May 21, 1958, p. 299-300.

Effect of heat treatment on mechanical properties, and of the precipitation of carbon from the solid supersaturated solution by measurement of the electrical resistance at very low temperatures. 5 ref. (N7, J27; Fe-a)

280-N.\* **Model for Solute Diffusion in Crystals With the Diamond Structure.** R. A. Swalin. *Journal of Applied Physics*, v. 29, Apr. 1958, p. 670-674.

A theory for solute diffusion in crystals with a diamond structure, such as Ge and Si, is derived by considering the effect of impurity ion size difference and also the coulombic interaction between impurity ions and charged vacancies. (N1, M26; Ge, Si)

281-N.\* **Diffusion of Tungsten in Nickel and Reaction at Interface With SnO.** Herbert W. Allison and George E. Moore. *Journal of Applied Physics*, v. 29, May 1958, p. 842-848.

Diffusion rates of W in single crystal and polycrystalline Ni were measured between 1100° C. and 1275° C. by using radioactive tungsten-185 and a sectioning technique. Grain boundary diffusion was observed by use of radio-autographs. A simple vacancy mechanism accounts for nearly all of the diffusion; some refinement is required for the transport observed at greater depths. (N1e; W, Ni)

282-N. **An Improved Czochralski Crystal-Pulling Furnace.** K. H. J. C. Marshall and R. Wickham. *Journal of Scientific Instruments*, v. 35, Apr. 1958, p. 121-125.

This apparatus differs from previous designs in that it combines rapidity of set-up with ease of operation and almost perfect vision during the crystal-growing cycle. The heating element is of resistance heated graphite and provision is made for growing either in vacuum or in an inert gas atmosphere. 11 ref. (N3r, X24f; Ge, Si)

283-N. **Diffusion of Iron, Cobalt, and Nickel in Single Crystals of Pure Copper.** C. A. Macklitt. *Physical Review*, v. 109, Mar. 15, 1958, p. 1964-1970.

The rates of diffusion of radioactive tracers of Fe, Co and Ni in single crystals of pure Cu measured as a function of temperature from about 700 to 1075° C. 31 ref. (N1a, 2-61; Cu, Fe, Co, Ni, 1-59, 14-61)

284-N. **Diffusion of Argon in Silver With an Appendix on the Diffusion of Rare Gases in Uranium.** A. D. Le Claire and A. H. Rowe. *United Kingdom Atomic Energy Authority, AERE M/R 1417*, 1957, 35 p.

21 ref. (N1a; Ag, U, EG-m43)

285-N. **Calculation of Volumes of Activation for Diffusion in Solids.** Robert W. Keyes. *University of Chicago, Institute for the Study of Metals, 48th Quarterly Report*, Pt. 4. Mar. 1958, p. 58-74.

28 ref. (N1c, P13a)

286-N.\* (English.) **Influence of Heat Treatment on the Strain-Aging of Aluminum-Killed Steel.** P. Szeki. *Acta Technica*, v. 20, no. 1-2, 1958, p. 145-151.

Impact tests were made at various temperatures to determine brittle transition temperatures of variously heat treated steels. Tendency for strain aging is least if after combining with oxygen there is still enough Al for combining with nitrogen and if before cold working steel is heat treated so as to precipitate nitrogen in form of finely dispersed AlN—for example, by quenching as quickly as possible from temperatures which slightly exceed A<sub>s</sub> and tempering below 700° C. 7 ref. (N7e, 2-60, 2-64; ST-c, CN-g)

287-N.\* (English.) **Isothermal Transformation of Austenite in Carbon Steels Containing 0.50 Per Cent C and 0.18 Per Cent C.** Sten Modin. *Jernkontorets Annaler*, v. 142, no. 2, 1958, p. 37-79.

Electron and light microscope investigation. Pearlite and bainite structures formed on isothermal transformation at times from 1 sec. to 30 min. and at temperatures from 350 to 700° C. 18 ref. (N8g, N8h, N8m, 2-60, 2-61; CN-g)

288-N. (English.) **Diffusion of Lead in Lead Telluride.** B. I. Boltaks and Iu. N. Mokhov. *Soviet Physics-Technical Physics*, v. 1, no. 11, 1957, p. 2366-2368.

7 ref. (N1; Pb, Te)

289-N. **Diffusion and Solubility of Silver in Germanium.** A. A. Bugal, V. E. Kosenko and E. G. Miseliuk. *Soviet Physics, Technical Physics*, v. 2, 1957, p. 1553-1557. (Translation by American Institute of Physics, Inc.)

The solubility and diffusion of Ag in Ge studied by radioactive tracer method. Results compared with the interstitial diffusion theory of

- Wert and Zener. 9 ref. (Nie, N12p; Ag, Ge)
- 290-N.\* (German.) **Contribution on Quench Aging of Mild Unalloyed Steel on the Basis of Observations on Recovery.** Matthias Nacken and Herbert Sturies. *Archiv für das Eisenhüttenwesen*, v. 29, Apr. 1958, p. 235-240.  
Study of aging and recovery by measuring torsion oscillation damping. Results of experiments on bessemer steel and high-purity iron. (N7a, N4; ST-g, Fe-a)
- 291-N.\* (German.) **Age Hardening of Titanium Alloys.** Ulrich Zwicker. *Zeitschrift für Metallkunde*, v. 49, Apr. 1958, p. 179-184.  
Dependence of hardness on grain orientation. Age hardening of mixed alpha and beta crystals. Hardness in case of martensite formation and in the presence of omega phase. Age hardening after quenching from alpha-beta range. Influence of annealing temperature. (N7a; Ti)
- 292-N.\* (German.) **Age Hardening and Phase Alterations During Beta-Alpha Titanium Transformation in Titanium-Cobalt Alloys.** Ernst Raub and Hans Beeskow. *Zeitschrift für Metallkunde*, v. 49, Apr. 1958, p. 185-190.  
Hardness measurements, radiographic and metallographic study of beta-titanium alloys stabilized by cobalt. Transformation mechanism and its dependence on composition of alloys and heat treatment. Effect of omega-phase segregation on hardening. According to results of radiographic investigations presence of another intermediate phase is possible. (N7a, N6; Ti, Co)
- 293-N.\* (German.) **Investigation on Precipitation in a Constant Temperature Gradient.** Horst Böhm. *Zeitschrift für Metallkunde*, v. 49, Apr. 1958, p. 190-194.  
Experimental technique. Investigation of a Ti alloy with 7% Mn, and of an Al alloy with 4.5% Cu. Results of hardness measurements and metallographic examination. Advantages of the proposed method. (N7b; Ti-b, Mn, Al-b, Cu)
- 294-N.\* **The Effect of Some Common Alloying Elements on the Volume Change at Acs of a 0.35% Carbon Steel.** A. S. Kenneford. *Iron and Steel Institute Journal*, v. 189, June 1958, p. 135-138.  
Dilatometric investigation shows that Si and Mo and possibly also V, reduce the volume change at Acs, whereas Mn, Cr, Ni and Co have the opposite effect. These volume changes can affect those taking place at the Ms temperature, and consequently also the susceptibility of a steel to cracking on quenching. 4 ref. (N8, P10d, 2-60; AY)
- 295-N.\* **Can an Improved Nonaging Steel be Produced Commercially?** Eric R. Morgan. *Metal Progress*, v. 73, June 1958, p. 88-94.  
The successful development of an improved nonaging steel to replace aluminum-killed steel awaits the careful coordination of chemical composition, precise annealing and a special temper rolling technique. 6 ref. (N7, F23r, J23; CN-g)
- 296-N. **Formation Mechanism of Graphite Nuclei.** A. F. Landa and V. D. Yakhnina. *Metal Progress*, v. 73, June 1958, p. 152-153. (From *Metallovedenie i Obrabotka Metallov*, no. 12, 1956, p. 46-50). (N8s, 2-64; CI-p)
- 297-N. **Change of Length During Transformation of Iron Under Stress.** *Nature*, v. 181, May 17, 1958, p. 1396-1397.  
(N6p, P10d; Fe, 3-66)
- 298-N. **Effect of Primary Alpha on the Beta Decomposition of Zirconium-Uranium-Oxygen Alloys.** David L. Douglass and Lyle L. Marsh. *Battelle Memorial Institute. U. S. Atomic Energy Commission, BMI-1249*, Jan. 14, 1958, 16 p. (Order from Office of Technical Services, Washington 25, D. C.) \$75.  
Effect of primary alpha present during the solution treating cycle on the incubation period for the decomposition of beta and on the resultant structure was determined for Zr-base alloys containing from 7 to 15% U and from 0.094 to 0.29% O. 6 ref. (N6p; Zr, U, O)
- 299-N. **Effects of Transformations and Precipitations on Strength.** E. P. Klier. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB131280 and PB131281, p. 84-102.  
Those heat treatments which lead to usable high tensile strengths universally do so by the development of a fine precipitate structure which is distributed uniformly through a suitable matrix. Data for a 5% Cu-Al alloy and 4340 steel. (N7, Q27a; Al, Cu, AY)
- 300-N.\* (French.) **Influence of Axial Compression on the Allotropic Beta to Alpha Transformation of High-Purity Titanium.** Paul Costa and Georges Cizerin. *Comptes Rendus*, v. 246, Apr. 14, 1958, p. 2261-2263.  
Under the effect of a slight axial compression, Ti undergoes abnormal lengthwise contraction during passage from beta to alpha phase. This can be explained by a shear mechanism of the beta lattice on a single preferred plane among all possible planes. Phenomenon occurs only in high-purity Ti. (N6p; Ti-a)
- 301-N.\* (Japanese.) **Grain Growth in a Cold Rolled Aluminum Single Crystal.** Shiro Kohara. *Light Metals (Tokyo)*, v. 8, Mar. 1958, p. 4-8.  
The crystal was rolled on the (110) plane, in the (112) direction. Artificial nucleation was applied by scrubbing with emery paper, then the specimen was annealed at 350° C. for 600 sec. Grains on scrubbed side had an equiaxial shape and random orientation; those on unscrubbed side were of elongated shape in two directions, related to the matrix by a rotation around (111) axes. A deformed single crystal matrix not fully symmetrical for the growth rates of recrystallized grains is suggested. 18 ref. (N3r; Al)
- 302-N. (Russian.) **Volumetric Measurement of Steel Transformation by Dilatometric Curves.** Yu. A. Kocherzhinskii. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 437-439.  
4 ref. (N8, M23b; ST)
- 303-N. **Experimental Studies on Grain Growth in Metals.** H. U. Asstrom. *Arkiv för Fysik*, v. 13, 1958, p. 60-80.  
Study of interfacial grain-boundary energies by the calorimetric method. (N3, M23r)
- 304-N.\* **Effects of Strain-Rate and Temper Rolling on the Strain-Aging Characteristics of Rimmed Deep-Drawing Steel.** D. H. Fisher, R. L. Carlson and W. T. Lankford. *American Society for Testing Materials, Preprint no. 87*, 1958, 11 p.  
Effects after aging times of 29, 150 and 800 hr. investigated for two amounts of temper rolling extension (1.2% and 2.3%) at strain rates varying from 0.001 to 0.4 per sec. Commercially temper-rolled material was used, and all tests were performed at room temperature. 8 ref. (N7e; ST-d)
- 305-N.\* **Direct Observation of the Strain Field Produced by Coherent Precipitated Particles in an Age-Hardened Alloy.** R. B. Nicholson and J. Nutting. *Philosophical Magazine*, v. 3, May 1958, p. 531-533.  
Transmission electron micrographs of aged 4% Cu aluminum alloy foils show unusual contrast near precipitated particles. This is interpreted in terms of Bragg diffraction from regions distorted by elastic coherency strains between the precipitate and the matrix. 6 ref. (N7a; Al, Cu)
- 306-N. **Time Decrease of Permeability in Iron.** A. J. Bosman, P. E. Brommer, H. J. Van Daal and G. W. Rathenau. *Physica*, v. 23, Nov. 1957, p. 989-1000.  
The time decrease of initial permeability has been studied for Fe containing interstitial nitrogen. The activation energy for nitrogen diffusion is derived from this. A method for resolving the different relaxation times is given. 14 ref. (N1h, P13a; Fe, N)
- 307-N. **Influence of Pressure on the Mean Time of Stay of Interstitial Nitrogen in Iron.** A. J. Bosman, P. E. Brommer and G. W. Rathenau. *Physica*, v. 23, no. 11, Nov. 1957, p. 1001-1006.  
9 ref. (N1c, 3-74; Fe, N)
- 308-N. **On the Diffusion of Indium, Antimony and Tellurium in Indium Antimonide.** B. I. Boltaks and G. S. Kulikov. *Soviet Physics, Technical Physics*, v. 2, no. 1, 1957, p. 67-68. (Translation by American Institute of Physics, Inc.)  
Study of semiconducting materials to clarify effect of impurities on their physical properties. 9 ref. (N1e, 3-69; In, Sb, Te)
- 309-N. (Czech.) **Crystallization of Dendrites From Aqueous Solutions.** Vladimír Koselev. *Hutnické Listy*, v. 13, no. 4, 1958, p. 299-308.  
Study of conditions resulting in modification of normal crystallization into dendritic and globular types. Mechanism of dendritic crystallization; similarity of dendritic crystals from aqueous solutions and those obtained during solidification of melt as in the case of steel. (N3b; ST)
- 310-N.\* (Czech.) **Transformation Diagrams of Continuous Cooling for 9 Czechoslovak Steels.** Jaroslav Vana. *Hutnické Listy*, v. 13, no. 4, 1958, p. 308-313.  
Diagrams plotted using combination of dilatometric method for region of low cooling velocities and Liedholm's method of interrupted hardenability tests for region of middle and higher cooling velocities. 14 ref. (N8; AY)
- 311-N.\* (German.) **Relaxation Diffusion and Grain Coarsening in Aluminum.** F. Erdmann-Jesnitzer and H. Hadamovsky. *Aluminium*, v. 34, May 1958, p. 254-263.  
Aluminum specimens containing 0.075 and 0.2% Fe which were 70% reduced at 200° C. were annealed at 600° C. and quenched in water, 99.5% cold reduced and then re-

crystallized by heating for 4 sec. at 560° C. and 3 hr. at 300° C. Critical reductions were followed by recrystallization at different rates of heating. Critical reduction is defined as that reduction for which at specified annealing temperature the deformed structure is just completely recrystallized by grain growth. Effect of relaxation diffusion is greatest at low solubility of alloying elements, particularly when combined with supersaturation. (N5, Al)

**312-N.\*** (Russian.) Effect of Heating Speed on the Irregular Concentration of Carbon in Austenite During Hardening. A. G. Spektor. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 142-149.

It is known that brief heating of steel results in uneven distribution of carbon liberated from the carbide phase. It is possible to show two basic causes for microscopic irregularity of austenite. The first has its source in the irregular dispersion of the carbide phase in the resulting structure. The other aspect of nonhomogeneous solution appears to be the natural consequence of spacial discontinuity of the carbide phase. 5 ref. (N8, 3-67; ST)

**313-N.\*** (Russian.) Effect of Recrystallization on Texture in Low-Carbon and Silicon Steels. K. V. Grigorov, G. P. Blokhin and M. Ya. Zakutov. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 150-153.

Change of texture investigated by magnetometric methods in cold rolled and transformer (silicon) steel during alpha-gamma transformation. Intense weakening takes place in the structure but does not disappear completely. 8 ref. (N5, M26c; CN-g, AY, Si)

**314-N.** Aging Characteristics of Nickel-Chromium Alloys Containing Appreciable Amounts of Titanium and Aluminum. Neil E. Rogan and Nicholas J. Grant. *American Society for Testing Materials, Preprint*, no. 82, 1958, 12 p.

Aging characteristics and high-temperature strength of vacuum melted, wrought Ni-Cr-Ti-Al alloys. 8 ref. (N7a, Q27a, 2-62; Ni, Cr, Ti, Al)

**315-N.** Diffusion in Metals. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 492-495.

Literature review covering chemical diffusion in alloys; self-diffusion in alloys; diffusion in pure metals; grain boundary diffusion; interstitials. (N1)

**316-N.** Crystal Growth of Cobalt Electrodeposited on Copper Single Crystal. Seiji Fukuda. *Japan Journal of Applied Physics*, v. 27, Apr. 1958, p. 236-242.

7 ref. (N12d; Cu, Co)

**317-N.** Study of Precipitate Particles in Cu-Co Employing Ferromagnetic Resonance. D. S. Rodbell. *Journal of Applied Physics*, v. 29, Mar. 1958, p. 311-312.

6 ref. (N7b, P16f; Cu-b, Co-b)

**318-N.\*** Survey of Factors Affecting the Properties of Gray Iron. L. J. Huetter and H. H. Stadelmaier. *North Carolina State College, Engineering School Bulletin*, no. 66, Feb. 1958, p. 5-24.

Relations between properties and microstructure. Shape and size of the graphite particles outweighs the influence of metallic matrix. 42 ref. (N8s, Q-general; CI-n)

**319-N.** Fission Gas Behavior in the Uranium-Aluminum System. Myron

B. Reynolds. *Nuclear Science and Engineering*, v. 3, Apr. 1958, p. 428-434.

Data on diffusion of fission Krypton from irradiated 20% U-Al alloy. (N15d, M24b; U, Al-b, 2-67)

**320-N.** The Solution of Inert Gas Atoms in Metals. D. E. Rimmer and A. H. Cottrell. *Philosophical Magazine*, v. 2, Nov. 1957, p. 1345-1353.

21 ref. (N15d, N16m)

**321-N.** Ordering and Disordering Processes in CuAu. I. Leonard, R. Weisberg and S. L. Quimby. *Physical Review*, v. 110, Apr. 15, 1958, p. 338-348.

Isothermal change of Young's modulus with time in a single crystal of CuAu following a sudden change in temperature below the critical temperature when a specimen is initially in various states of equilibrium long-range order. (N10a, Q21a, Cu, Au, 14-61)

**322-N.** The Transition Temperature of the Transition Between Grey and White Tin. G. V. Raynor and R. W. Smith. *Royal Society, Proceedings*, v. 244, Feb. 1958, p. 101-109.

6 ref. (N6p; Sn)

**323-N.\*** The Effect of Alloy Structure on the Diffusion Process. L. M. Mirskii. *United Kingdom Atomic Energy Authority, AERE Lib/Trans* 773, 1957, 16 p.

The data obtained can be used in making new alloys and in designing diffusion processes for coating alloys. The method used permits determination of diffusion coefficients of both components in the compound (other methods measure the diffusion of one component only); autoradiography shows the distribution of the alloy components; the picture of atomic migrations in the lattice obtained is nearer to reality than that obtained by other methods. 18 ref. (N1)

**324-N.** Growth of Single-Crystal Layers of Silicon and Germanium From the Vapor Phase. N. N. Sheftal', N. P. Kokorish and A. V. Krasilov. *Academy of Sciences of the USSR, Bulletin of*, v. 21, no. 1, 1957, p. 140-150. (Translation by Columbia Technical Translations.)

13 ref. (N15g; Si, Ge, 14-61)

**325-N.** Recrystallization Diagram of Chromium. E. M. Savitsky, V. F. Terekhova and A. V. Kholopov. *Academy of Sciences of the USSR, Proceedings*, v. 109, July-Aug. 1956, p. 485-487. (Translation by Consultants Bureau, Inc.)

4 ref. (N5f; Cr-a)

**326-N.** Effect of Plastic Deformation on Martensite Formation. M. G. Gaidukov and V. D. Sadovskii. *Metallovedenie i Obrabotka Metallov*, v. 4, Apr. 1958, p. 2-7. (Henry Brucher, Altadena, Calif., Translation no. 4180.)

Austenitic steel specimens alloyed with various percentages of Mn, Cr and Ni were tested for stability of transformation of austenite into martensite under plastic deformation. Stability was found to depend essentially on the relative position of the martensite point and the deformation temperature as well as on chemical composition of the steel and a number of other factors. 7 ref. (N8p, 3-68; AY)

**327-N.** Strain Hardening, Recrystallization, and Hot Strength of Alloyed Austenite. L. A. Meshop and M. E. Blanter. *Metallovedenie i Obrabotka Metallov*, v. 4, Apr. 1958, p. 7-9. (Henry Brucher, Altadena, Calif., Translation no. 4181.)

Relation between strain harden-

ing, the softening process in heating and the characteristics of long and short-time strengths at high temperatures were determined for an austenitic steel with the composition 0.38% C, 0.58% Si, 1.4% Mn, 12.67% Cr, 7.6% Ni, 1.13% Mo, 1.31% V, 0.48% Nb, 0.008% S and 0.015% P. The effects of additional amounts of Cr, Ni, Co and Mo were further studied. (N7e, N5, Q27a, 2-62, 2-60; SS)

**328-N.** Effect of High-Temperature Aging on the Structure and Properties of 18-8 Steel. Kh. I. Cheskis and S. I. Volfson. *Metallovedenie i Obrabotka Metallov*, v. 4, Apr. 1958, p. 16-25. (Henry Brucher, Altadena, Calif., Translation no. 4183.)

A systematic study by metallographic magnetic saturation and electrical resistivity methods of the effect of long-time heating (up to 10,000 hr.) at 500-900° C. on the properties of standard 18-8 steels. 8 ref. (N7, Q-general; SS)

**329-N.** Effect of Magnesium on the Graphitization of White Cast Iron. A. V. Chernovol and Yu. N. Taran. *Metallovedenie i Obrabotka Metallov*, v. 4, Apr. 1958, p. 49-51. (Henry Brucher, Altadena, Calif., Translation no. 4189.)

Microstructural analysis of white cast iron (containing 3.0% C, 0.52% Si, 0.32% Mn, 0.021-0.002% S, 0.09% P and 0.01, 0.047, 0.76, and 0.093% Mg) showed no appreciable effect of Mg on the structure. Experimental data did not confirm the hypothesis that the formation of spheroidal graphite resulted in the formation of low-stability carbides in Mg cast iron, nor any sharp slowing down of the graphitization. 5 ref. (N8s, M27, 2-60; CI-r, Mg)

**330-N.\*** (Rumanian.) Structure and Magnetic Properties of Several Alloys of the System Fe-C-Al. N. Geru, P. Iliescu, A. Moroiu and E. Crucianu. *Studii si Cercetari de metalurgie*, v. 2, no. 4, 1957, p. 397-413.

Structural changes produced by simultaneous increase in carbon (1.1-2.3%) and Al content (3-12%) were analyzed by parallel microscopic and thermomagnetic studies. The cementite was found to change its composition gradually with increase in the Al content; with more than 8% Al, a new epsilon phase with different properties from the cementite, its own characteristic lattice and interesting magnetic properties were obtained. 5 ref. (N8, P16; Fe, C, Al)

**331-N.** (Russian.) Abnormal Softening of Lead-Tin Alloys at Room Temperature. L. N. Larikob. *Doklady Bolgarskoi Akademii Nauk*, v. 10, Jan-Feb. 1958, p. 65-68.

(N7; Pb, Sn)

## Physical Properties

**281-P.\*** The Freezing Points of High-Purity Metals as Precision Temperature Standards. Pt. 3. Thermal Analyses on Eight Grades of Zinc With Purities Greater Than 99.99%. E. H. McLaren. *Canadian Journal of Physics*, v. 36, May 1958, p. 585-598.

Liquidus points intercompared with a precision of about 0.002° C. and alloy melting ranges examined following different rates of freezing. A melting range parameter

may provide a more sensitive index of the purity than the liquidus temperature since the shape of the melting curve is strongly influenced by segregation of impurities due to coring and freezing. 12 ref. (P12n; Zn-a)

**282-P.\* Thermo-Electricity at Low Temperatures.** Pt. 5. Suitability of Lead as a Standard Reference Material. J. P. Jan, W. B. Pearson and I. M. Templeton. *Canadian Journal of Physics*, v. 36, May 1958, p. 627-630.

Measurements by improved method of the thermo-electric force, as a function of temperature of dilute lead alloys containing bismuth, tin, indium and cadmium in solid solutions. 4 ref. (P15, 2-63; Pb)

**283-P.\* Thermal Restoration of Oxygenated Germanium Surfaces.** A. J. Rosenberg, P. H. Robinson and H. C. Gatos. *Journal of Applied Physics*, v. 29, May 1958, p. 771-775.

Cleaved Ge surfaces, oxygenated at room temperature, were heated under high vacuum and the restoration of their oxygen-adsorbing capacity determined. No restoration was observed at 425° C., above 575° C., however, the oxygen-adsorbing capacity of the surfaces was completely recovered. Discharge of GeO from the surface was associated with this process. The restoration process followed first-order reaction kinetics with an activation energy of 56 k-cal. per mole. Concurrently with restoration a pronounced decrease in the surface area was observed. (P13d, P13a; Ge, O)

**284-P.\* Combustion of Zirconium in Oxygen.** W. L. Doyle, J. B. Conway and A. V. Grosse. *Journal of Inorganic and Nuclear Chemistry*, v. 6, no. 2, 1958, p. 138-144.

The combustion of Zr in oxygen leads to one of the highest temperatures obtainable by the combustion of metals—estimated to be 4930° K. at 1.0 atm pressure. Technique developed for operating a powdered zirconium-oxygen flame, producing the highest metal flame temperature reported to date. 16 ref. (P12; Zr)

**285-P. Semiconducting Properties of Mg-Si Single Crystals.** R. G. Morris, R. D. Redin and G. C. Danielson. *Physical Review*, v. 109, Mar. 15, 1958, p. 1909-1915.

19 ref. (P15g; Mg, Si, 14-61)

**286-P. Semiconducting Properties of Mg-Ge Single Crystals.** R. D. Redin, R. G. Morris and G. C. Danielson. *Physical Review*, v. 109, Mar. 15, 1958, p. 1916-1920.

(P15g; Mg, Ge, 14-61)

**287-P. Physics and Chemistry of Metals.** N. F. Mott. *Physical Society, Yearbook*, 1957, p. 2-13.

Physical techniques in study of the metallic bond; effect of chemical bonding forces on mechanical properties; roll of cross slip in thermal softening. 29 ref. (P-general, Q-general)

**288-P.\* Volume Change of Indium Antimonide During Fusion.** Norman H. Nachtrieb and Noriko Clement. *University of Chicago, Institute for the Study of Metals, 48th Quarterly Report*, Pt. 5, Mar. 1958, p. 75-81.

Determined from measurements of the change in pressure of argon at constant volume. The average of six determinations gives  $100\Delta V/V_s = -13.7 \pm 0.5\%$  referred to the solid. 9 ref. (P10d, P12; In, Sb)

**289-P.\* Experimental Determination of the Electrical Resistivity of**

**the Liquid Alloys, Hg-In, Hg-Tl, Ga-In, and Ga-Sn, and of Liquid Gallium.** L. G. Schulz and Peter Spiegler. *University of Chicago, Institute for the Study of Metals, 48th Quarterly Report*, Pt. 12, Mar. 1958, p. 135-141.

Pure Hg was used as the reference material. The solution of In or Tl in Hg caused a large decrease in the resistivity whereas the solution of In or Sn in Ga caused a slight increase. For solutions of Tl in Hg closely corresponding to Hg-Tl<sub>2</sub> at temperatures above 16° C. there were no anomalies in the electrical properties. 19 ref. (P15g; Hg, In, Tl, Ga, Sn, 14-60)

**290-P. (English.) Effect of Impurities on the Electrical Properties of Lead Telluride.** T. L. Kovalchik and Iu. P. Maslakovets. *Soviet Physics-Technical Physics*, v. 1, no. 11, 1957, p. 2337-2349.

15 ref. (P15, 3-69; Pb, Te)

**291-P. Electrical Properties of Bismuth Alloys. Pt. 3. Ternary Alloys. "Reversion" to the Properties of Bismuth.** L. I. Mokievskii and G. A. Ivanov. *Soviet Physics, Technical Physics*, v. 2, 1958, p. 1576-1585. (Translation by American Institute of Physics, Inc.)

Electrical properties of the alloys Bi-Te-Sn, Bi-Te-Pb, Bi-Sn-Se and Bi-Pb-Se. Relationships are obtained between the components of alloys consisting of elements of the IV and VI groups of the periodic table, which yield a "reversion" of the alloys to properties which are the same as those of pure Bi. The concentration of the current carriers and their mobilities are computed to Bi and in ternary "reverted" alloys. 13 ref. (P15g; Bi)

**292-P. Physical Properties of Alloys and Molecular Concentration.** P. A. Savintsev. *Soviet Physics, Technical Physics*, v. 2, 1957, p. 1149-1153. (Translation by American Institute of Physics, Inc.)

8 ref. (P-general, M25m)

**293-P. Work Function of Activated Alloys of CuAlMg and CuAlBe.** V. N. Lepeshinskaia and V. A. Lebedeva. *Soviet Physics-Technical Physics*, v. 2, 1957, p. 1131-1139. (Translation by American Institute of Physics, Inc.)

12 ref. (P15k; Cu, Al, Mg, Be)

**294-P. On the Electrical Properties of the System: Lead-Antimony.** I. D. Konozenko and V. I. Ust'ianov. *Soviet Physics, Technical Physics*, v. 2, 1958, p. 1567-1575. (Translation by American Institute of Physics, Inc.)

Alloys of Pb and Sb which are formed on the basis of solutions of variable composition exhibit electrical characteristics completely definable in terms of the state of the primary solutions in the alloys. The electrical conductivity of the alloys is a function of the component concentration and the thermal state of the alloy. The temperature dependence of the electrical conductivity of a 1:1 alloy provides a sufficiently clear indication of the effect of the number of dissolved atoms (i.e., of the spots which exhibit a new short-range order) upon the magnitude and nature of the electrical conductivity. 9 ref. (P15; Pb, Sb)

**295-P.\* (French.) Measurement of Magnetocaloric Effect of MnAs.** Andre J. P. Meyer and Pierre Taglang. *Comptes Rendus*, v. 246, Mar. 24, 1958, p. 1820-1822.

Additional proof of antiferromagnetism of MnAs above its polymorphic transformation at 45° C. was obtained by measurement of magnetocaloric effect in function of temperature. 5 ref. (P16d, 2-61; Mn, As)

**296-P. (French.) Near-Saturation of Polycrystalline Ferromagnetic Materials in  $I/H^2$ .** Henri Danan. *Comptes Rendus*, v. 246, Mar. 24, 1958, p. 1822-1824.

8 ref. (P16, SGA-n)

**297-P.\* Calculated and Observed Effects of Texture on the Magnetic Properties and Young's Modulus of Nickel Sheet.** E. R. W. Jones, C. A. Clark and E. A. Fell. *British Journal of Applied Physics*, v. 9, May 1958, p. 178-184.

Experimental values for high-purity polycrystalline Ni sheet produced by powder metallurgy and annealed in purified hydrogen. Comparison between theory and experiment indicates good agreement for Young's modulus and fair agreement for magnetic properties. The textures were determined by X-ray photographic techniques. Strip possessing a cube recrystallized texture gave lower properties than recrystallized strip having a random grain orientation. 9 ref. (P16, Q21a, M26c; Ni, 4-53)

**298-P.\* The High Temperature Stability of Permanent Magnets of the Iron-Nickel-Aluminum System.** A. G. Clegg and M. McCaig. *British Journal of Applied Physics*, v. 9, May 1958, p. 194-199.

Open circuit magnetization of rectangular bars of various modern permanent magnet alloys measured at temperatures up to 550° C. Differential ballistic method used. After magnetization at room temperature, both reversible and irreversible losses occur on heating. These losses vary with material and dimension ratio and in an attempt to explain these variations demagnetization curves at 500° C. have been measured. 7 ref. (P16, 2-62; Fe, Ni, Al, SGA-n)

**299-P. Some Magnetic Properties of Dilute Anisotropic Ferromagnetic Alloys.** W. Sucksmith. *Electrical Research Association, Technical Report N/T74*, 1956, 8 p.

Magnetic properties of very small particles of iron which are precipitated out of dilute solid solutions in copper. Apparatus for measuring remanence and coercivity in the very low intensities of magnetization encountered. 10 ref. (P16, X26; Fe)

**300-P.\* Majority Carrier Lifetime in Copper Doped Germanium at 20° K.** D. A. H. Brown. *Journal of Electronics and Control*, v. 4, Apr. 1958, p. 341-349.

The time constant for recombination of a hole with a negatively charged Cu impurity center in Ge at 20° K. is derived from experimental data from two independent methods based on measurement of (a) the photoconductive sensitivity and (b) the semiconductor shot noise. Both methods give good agreement in order of magnitude, but the theoretical values are several orders of magnitude greater. 11 ref. (P15; Ge, Cu)

**301-P.\* Irradiation Damage and Recovery in Molybdenum and Tungsten.** G. H. Kinchin and M. W. Thompson. *Journal of Nuclear En-*

ergy, v. 6, May 1958, p. 275-284.

Specimens irradiated with pile neutrons at 30° C. and at -196° C. Recovery of the increase in resistivity studied; activation energies of 0.25 and 1.3 eV for Mo and 0.5 and 1.7 eV for W. A stored energy release of 0.4 cal. per g. from 50 to 250° C. also observed from Mo irradiated with  $1.3 \times 10^{19}$  n. per sq. cm. 9 ref.

(P13a, P15g, 2-67; Mo, W)

**302-P.** Mass Transfer in Liquid Metal Systems. Pt. 2. Isothermal Transfer. J. W. Taylor. *Nuclear Power*, no. 3/6, Mar. 1958, p. 101-105.

12 ref. (P10d; 14-60)

**303-P.\*** The Lattice Thermal Conductivity of a Gold-Platinum Alloy. J. A. Birch, W. R. G. Kemp and P. G. Klemens. *Physical Society Proceedings*, v. 71, May 1, 1958, p. 844-845.

Thermal and electrical conductivities of a 98% Au, 2% Pt alloy over a wide range of low temperatures measured and the lattice thermal conductivity from 2-90° K. deduced. 7 ref. (P11h, P15, 2-63; Au, Pt)

**304-P.** Thermal Expansion of Rare Earth Metals. Fred Barson, S. Legvold and F. H. Spedding. Iowa State College. U. S. Atomic Energy Commission, ISC-831, June 1956, 71 p. (Order from Office of Technical Services, Washington 25, D. C.) \$2.

High-temperature dilatometric investigation; coefficients of expansion; evidence of crystalline transformations which may occur; light cast on certain high-temperature transitions already discovered in several of the metals. Metals investigated were lanthanum, cerium, praseodymium, neodymium, gadolinium, terbium, dysprosium, erbium and ytterbium. 82 ref. (P11g; EG-g)

**305-P.** Irradiation Effects in Uranium. S. H. Bush. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 591-615.

Mechanical properties such as hardness, bend and tensile data are reviewed. Variables considered include burn-up, irradiation temperature, U<sup>235</sup> content, composition (to 3 wt. % alloy), post-irradiation annealing and tensile testing temperature. Drastic reductions in ductility occur at burn-ups as low as 0.02 at. %. Recovery of damage is limited on post-irradiation annealing. Changes in such physical properties as density, thermal conductivity, electrical resistivity and modulus of elasticity are reported. Effect of irradiation on microstructure. 45 ref.

(P-general, Q-general, M27, 2-67; U)

**306-P.** (English.) Electrical Properties of Ag<sub>2</sub>Te. Shin-ya Miyatani. *Physical Society of Japan, Journal*, v. 13, Apr. 1958, p. 341-350.

10 ref. (P15; Ag, Te)

**307-P.\*** (French.) Measurement of Variation of Coercive Force in Function of Angle in Nickel Films Condensed in Vacuo. A. Van Itterbeek and A. Dupre. *Journal de Physique et le Radium*, v. 19, Feb. 1958, p. 113-118.

Coercive force of evaporated Ni and Co films determined by measurement of magnetoresistance. Evaporation apparatus described. Thickness of films determined by optical method. Coercive force as function of angle between normal to plane of film and direction of

magnetic field. Change of coercive force as function of temperature. (P16; Ni, Co, 14-62)

**308-P.\*** (Russian.) Thermo-Electronic Emission From Binary Alloys During Process of Formation. K. F. Voitsekhovskii. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 3-7.

The effect on the current of thermo-electronic emission was studied while the atomic arrangement in a crystalline lattice of binary alloys was changing. Richardson's basic formula was confirmed and the problem of dependence of Richardson's constant on the range of S and concentration of C in case of cubic and other crystalline lattices was examined. This mathematical analysis is submitted for discussion. 10 ref. (P15k)

**309-P.\*** (Russian.) The Nonlinear Theory of Transitional Processes in Ferromagnetic Layers Magnetized by Longitudinal Alternating Poles. N. N. Zatselin. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 30-36.

The problem was examined mathematically. With the help of small parameters the problem of finding electromagnetic parameters for transition processes in homogeneous layers was resolved. In particular an expression was found for distribution of magnetic pole, induction and permeability of thicker layers, when magnetic poles of rectangular impulse were acting upon them. Numerical values are expressed for linear and nonlinear members. 6 ref. (P16)

**310-P.\*** (Russian.) Ferromagnetic Phase in Austenitic Heat Resistant Steel, Type 14-14. V. Z. Tseitlin. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 37-43.

Ferromagnetic alpha phase may have place in the structure of austenitic steels. It appears not only in the process of aging, but also as result of annealing after hardening, and disappears under definite conditions. It develops along grain boundaries and around individual carbides. Development of ferromagnetic phase under plastic deformation when gamma-alpha transformation is brought about by non-diffusion. 4 ref. (P16; SS)

**311-P.\*** (Russian.) Determination of Atom Distribution Density in Liquid Al and Bi by Means of Distinctive Temperatures Determined by Electronographic Data. A. I. Bublik and A. G. Buntar. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 53-57.

The density of radially distributed atoms was plotted against temperature. The quantity of the nearest atoms was determined at various temperatures. In liquid Al at fusion temperature the nearest sequence appears to be basic as well as crystalline. The density of particles diminishes at higher temperatures. In Bi, particles are arranged at near crystallization temperature in same order as in solid state. At high temperatures, Al and Bi approach medium density. 6 ref. (P12, M25; Al, Bi, 14-60)

**312-P.** Electric Properties and Applications of Silicon Carbide. N. P. Bogoroditskii, V. V. Pasunkov, G. F. Kholuianov and D. A. Ias'kov. *Academy of Sciences of the USSR, Bulletin*, v. 20, no. 12b, 1957, p. 1440-1447. (Translation by Columbia Technical Translations, Inc.)

Study of application of silicon carbide as main component in waveguides, miniature nonlinear resistors for automatic equipment and integral-formed ignition electrodes of high mechanical strength. 14 ref. (P15, T1; Si, NM-a35)

**313-P.** Metallurgical Aspects of Nuclear Power Engineering. Pt. 1. J. C. Wright. *Engineer*, v. 205, Apr. 25, 1958, p. 613-615.

Basic metallurgy associated with nuclear power reactors, with emphasis on both gas-cooled and liquid-cooled reactors. Physical metallurgy of fissile fuel metals U, Pu and Th.

(P-general, T11, 17-57; U, Pu, Th)

**314-P.** Metallurgical Aspects of Nuclear Power Engineering. Pt. 2. J. C. Wright. *Engineer*, v. 205, May 2, 1958, p. 658-660.

Behavior of fissile metals under irradiation; scattering; absorption; annealing of radiation damage; radiation effects and radiation growth of U. 9 ref. (P18, T11g, 2-67; U)

**315-P.** On the Periodic Relationship of Electrode Potentials of Metals in Fused Salts. Yu. K. Delimarsky. *Journal of General Chemistry of the USSR*, v. 26, 1957, p. 3303-3306. (Translation by Consultants Bureau, Inc.)

10 ref. (P15j)

**316-P.\*** Radiation Effects in Magnetic Materials. D. I. Gordon, R. S. Sery and R. E. Fischell. *Nucleonics*, v. 16, June 1958, p. 73-77.

Almost all magnetic materials show deterioration but magnitudes vary considerably. One material was improved by radiation. Magnetic properties are insensitive to all types of radiation except fast neutrons. 22 ref. (P16, P17; SGA-n)

**317-P.** Resistivity Due to Dislocations in Copper. Walter A. Harrison. *Physics and Chemistry of Solids*, v. 5, no. 1/2, 1958, p. 44-46.

Scattering of electrons by a dislocation with a hollow core. Effect of such a core upon the electrical resistivity may be many times greater than the effect of the strain field. 10 ref. (P15g, M26b; Cu)

**318-P.\*** Optical Properties of Semiconductors Under Hydrostatic Pressure. Pt. 1. Germanium. William Paul and D. M. Warschauer. *Physics and Chemistry of Solids*, v. 5, no. 1/2, 1958, p. 89-101.

The room-temperature absorption spectrum of high-purity single-crystal Ge measured between absorption coefficients of 1 and 100 at hydrostatic pressures up to 7000 kg. per sq. cm. Results interpreted to give a pressure coefficient for the optical energy gap in satisfactory agreement with the more precise value determined from measurement of the intrinsic resistivity as a function of pressure. 16 ref. (P17, 3-74; Ge, 14-61)

**319-P.\*** Optical Properties of Semiconductors Under Hydrostatic Pressure. Pt. 2. Silicon. William Paul and D. M. Warschauer. *Physics and Chemistry of Solids*, v. 5, no. 1/2, 1958, p. 102-106.

The pressure coefficient of the optical absorption edge due to indirect transitions has been measured in Si over a pressure range of 1-8000 kg. per sq. cm. 9 ref. (P17, 3-74; Si)

**320-P.** Variation of Resistivity According to Thickness for Thin Layers of Lead. F. Ciorascu, A. Deveny, M. Nachman and M. Oncescu. *Revue de Physique*, v. 2, no. 2, 1957, p. 199-208.

19 ref. (P15; Pb)

**321-P.** Dilatometric Determination of the Coefficient of Expansion of Alpha-Uranium. *Soviet Journal of Atomic Energy*, v. 3, no. 9, 1957, p. 1074-1075. (Translation by Consultants Bureau, Inc.)

Dilatometric studies conducted with a differential dilatometer in a vacuum and a pyrox standard. Heating and cooling rate for cycles up to 630°C was 150°C per hr. Isotropic specimens exhibit the same behavior independently of their origin, with very small variation of the expansion coefficient. The dilatometric curves showed good reproducibility, which was not the case for U with preferred orientation because of "thermal coupling". 4 ref. (P11g; U)

**322-P.** On the Change of Electrical Resistivity in Elementary Dislocation Generation. E. D. Shchukin, V. N. Rozhanskii and Iu. V. Goriunov. *Soviet Physics, Technical Physics*, v. 2, no. 2, 1957, p. 420-422. (Translation by American Institute of Physics, Inc.)

(P15g; Cd, Zn)

**323-P.** Equilibrium and Nonequilibrium Electrical Properties of Polycrystalline Selenium. P. T. Kozirev. *Soviet Physics, Technical Physics*, v. 2, no. 1, 1957, p. 27-34. (Translation by American Institute of Physics, Inc.)

8 ref. (P15; Se)

**324-P.** Some Features of the Electrical Properties of HgSe-HgTe Films. O. D. Elpat'evskaia and A. R. Regel'. *Soviet Physics, Technical Physics*, v. 2, no. 1, 1957, p. 35-39. (Translation by American Institute of Physics, Inc.)

14 ref.

(P15, M24c; Hg, Se, Te, 14-62)

**325-P.** An Investigation of the Thermo-Electric Properties of Lead Selenide and Lead Telluride. N. V. Kolomoets, T. S. Stavitskaia and L. S. Stil'bans. *Soviet Physics, Technical Physics*, v. 2, no. 1, 1957, p. 59-66. (Translation by American Institute of Physics, Inc.)

(P15, 2-61; Pb, Se, Te, 14-68)

**326-P.** Thermal and Thermo-Electric Properties of Alloys of Silicon With Transition Metals. P. V. Gel'd. *Soviet Physics, Technical Physics*, v. 2, no. 1, 1957, p. 95-99. (Translation by American Institute of Physics, Inc.)

Study of thermo-electromotive force, conductivity, coefficients of expansion and specific heats of alloys of Si with Fe, Cr and Mn.

(P11g, P11h, P12r, P15g; Si, Fe, Cr, Mn)

**327-P.** Electrical Properties of the Intermetallic Compound CdSb. I. M. Pilat. *Soviet Physics, Technical Physics*, v. 2, no. 1, 1957, p. 100-103. (Translation by American Institute of Physics, Inc.)

(P15; Cd, Sb)

**328-P.** Production and Investigation of Intermetallic Compounds in Thin Films. V. A. Presnov and V. F. Synorov. *Soviet Physics, Technical Physics*, v. 2, no. 1, 1957, p. 104-107. (Translation by American Institute of Physics, Inc.)

13 ref. (P15; Al, Sb, In, Sb, Ga, Sb, 14-62)

**329-P.** On Intermetallic Alloys of Platinum and Gold With Alkali and Alkaline Earth Metals. I. L. Sokol'skaia. *Soviet Physics, Technical Physics*, v. 2, no. 1, 1957, p. 108-110.

Electrical conductivity and electrical and thermo-electric properties of the systems Na-Au, Na-Pt and Ba-Pt. 7 ref. (P15; Au, Ba, Na, Pt)

**330-P.** Galvanomagnetic Properties of Tellurium at Low Temperatures. Pt. 1. S. S. Shalyt. *Soviet Physics, Technical Physics*, v. 2, no. 1, 1957, p. 166-178. (Translation by American Institute of Physics, Inc.)

13 ref. (P15, P16, 2-63; Te)

**331-P.** Motion of Minority Carriers in Germanium. M. Shtenbeck and P. I. Baranskii. *Soviet Physics, Technical Physics*, v. 2, no. 2, 1957, p. 195-204. (Translation by American Institute of Physics, Inc.)

Investigation of the motion of minority carriers injected by an ordinary emitter into a single crystal block of n-type Ge. Analysis of the damping, phase shift and deflection of the hole current in a magnetic field, modulated by frequency, and registered by an ordinary collector enabled accurate determination of time of flight, mobility and longitudinal and transverse diffusion coefficients of the minority carriers. 8 ref. (P15g, P16; Ge)

**332-P.\*** (Czech.) Physical Metallurgy of Uranium. Influence of Irradiation. Bohumil Prenosil. *Hutnické Listy*, v. 13, no. 4, 1958, p. 320-324.

Basic requirements for nuclear fuel elements formulated on the basis of data. Mechanism of reactions existing during irradiation in the operation of the reactor; changes of physical, mechanical and structural properties of U and surface phenomena such as surface sprinkling, shape modification and volume growth as consequence of irradiation. 17 ref.

(P10d, Q-general; U, 2-67)

**333-P.** (German.) Metal Sheets and Strips for the Electrical Industry. H. Hesselbach. *Industrie Anzeiger*, v. 80, Jan. 17, 1958, p. 16-19.

Electric properties of electro-sheet, the alloys used and influence of the degree of purity with which values of the magnetic properties increase. Magnetic anisotropy and influence of hot and cold rolling upon quality and processing. Survey of types and qualities available.

(P15, P16, T1, 17-57; ST, Si)

**334-P.\*** (German.) Possibilities of Influencing the Physical Properties of Ferromagnetic Materials. H. Jahn. *Die Technik*, v. 13, Feb. 1958.

Influencing of radioactive rays or magnetic fields. Samples treated in magnetic field showed noticeable differences in hardness, notch impact and tensile strength as compared with normally annealed samples, especially in low-carbon steels. Tests with greater cooling speeds showed mostly negative effects. Improvements in notch impact were obtained with high carbon contents. Influence of magnetic field treatment on properties of a Cr alloy steel. Tests indicate possibility of dispensing with expensive alloy components, by improvement of the properties of carbon steels in magnetic fields. 23 ref.

(P16, J-general, Q-general; CN)

**335-P.\*** (Russian.) Residual Electro-Resistance in Binary System of Me-

tallic Alloys. N. V. Grum-Grzhimailo. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 23-29.

Dependence of electro-resistance of binary alloys on their composition is not satisfactorily explained. The electrical conductivity theory proposed by Blokh and Nordheim does establish this dependence for the homogeneous phase of univalent alloys. A series of experiments on different alloys disproved Nordheim's formula of interpolation. 15 ref. (P15g, 2-60)

**336-P.\*** (Russian.) Comparative Measurement of Vapor Pressure of Chromium and Iron by Speed of Vaporization in Vacuum. V. D. Burlakov. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 91-101.

When heated together through a wide range of temperatures Cr and Fe vaporize at the same intensity. To clarify this phenomenon experiments were carried out separately for Cr and Fe. The open surfaces of the metals were vaporized in vacuum and the quantity of evaporation was determined either by the thickness of the evaporated layer, or by weighing the sample and the condensate. The results were analyzed mathematically. 12 ref. (P12c; Cr, Fe)

**337-P.\*** (Russian.) Problem of Latent Energy of Deformation in Solid Solutions. V. E. Panin and V. G. Milevskaya. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 120-126.

Latent energy of deformation in solid solutions of Cu-Ni system varies with the amount of fusion along the curve, with the maximum value at the mean region of concentration. This is dependent on the change in hardness, electrical resistance, dynamic coefficient, thermal electromotive force and other properties depending on composition. 9 ref. (P12; Cu, Ni, 14-67)

**338-P.** Scientists Develop "Four-Way" Magnetic Steel. *Electrical Engineering*, v. 77, Jan. 1958, p. 106-108. Cube-oriented Si-Fe.

(P16; AY, Si, SGA-n)

**339-P.** Nickel Powder With Adsorptive Properties Approaching Those of Evaporated Nickel Films. M. W. Roberts and K. W. Sykes. *Faraday Society, Transactions*, v. 54, Apr. 1958, p. 548-556.

Surface of Ni powder studied by measurement of hydrogen and krypton adsorption throughout the course of reduction in hydrogen for 102 hr. at 450°C. Adsorptive behavior closely approaches that of evaporated Ni films because of improvement in surface purity. This is attributed to removal of surface oxide by reduction and of involatile impurities by aggregation into separate phases of diffusion into the lattice. 11 ref. (P13d; Ni, 6-68)

**340-P.** Properties of Silicon and Germanium. Pt. 2. E. M. Conwell. *IRE Proceedings*, v. 46, June 1958, p. 1281-1300.

Important advances since 1952; bibliography. 117 ref.

(P-general, Q-general; Si, Ge)

**341-P.** Silicon Nitrides: Some Physico-Chemical Properties. E. T. Turkdogan, Patricia M. Bills and Valerie A. Tippet. *Journal of Applied Chemistry*, v. 8, May 1958, p. 296-302.

18 ref. (P-general; Si, 14-68)

**342-P.** Uniaxial Magnetic Anisotropy Induced in Fe-Ni Alloys by Magnetic Anneal. Eric T. Ferguson. *Journal*

of *Applied Physics*, v. 29, Mar. 1958, p. 252-253.

Anisotropy determined as a function of the composition, annealing temperature and duration. Result is consistent with the Néel-Taniuchi theory. 7 ref. (P16, J23; Fe-b, Ni-b)

**343-P.** Effects of Magnetic Fields Upon Anisotropic Iron Crystals. John H. L. Watson, Anthony Arrott and Michael W. Freeman. *Journal of Applied Physics*, v. 29, Mar. 1958, p. 306-308.

Problems inherent in magnetic alignment of alpha iron crystals explained by electron microscopic observation of the behavior of the single domain crystals under the effect of magnetic fields. With these specimens, which possess a fraction of magnetically unfavorable dendrites, intrinsic coercive forces of over 1700 oersteds have been measured without alignment. (P16, M21e; Fe, 14-61)

**344-P.** Heats of Formation of Alpha-Phase Silver-Cadmium Alloys. Raymond L. Orr, Alfred Goldberg and Ralph Hultgren. *Journal of Physical Chemistry*, v. 62, Mar. 1958, p. 325-327.

Heats of formation at 308° K. determined by liquid tin solution calorimetry for a series of alloys covering the alpha-phase of the Ag-Cd alloy system. (P12r, X24e; Ag-b, Cd-b)

**345-P.** Experiments Using a Simple Thermal Comparator for Measurement of Thermal Conductivity, Surface Roughness and Thickness of Foils or of Surface Deposits. R. W. Powell. *Journal of Scientific Instruments*, v. 34, Dec. 1957, p. 485-492.

Two metal balls are similarly mounted in a block of balsa wood, but one is at a slightly lower level so that it touches any surface on which the block rests. After heating to a small fixed temperature excess the block is laid in contact with the test surface. Differentially connected thermocouples attached to each ball measure the increased rate of cooling of the ball which makes contact. The differential e.m.f. observed after contact is made is shown to be a function of the thermal conductivity of the material on which the ball rests. 8 ref. (P11h, S14c, S15c, 1-53)

**346-P.** Measurements of Total Hemispherical Emissivity of Various Oxidized Metals at High Temperature. William R. Wade. *National Advisory Committee for Aeronautics, Technical Note* 4206, Mar. 1958, 43 p.

Stainless steel, mild steel, Ti, Ti alloy, Cu, Al, Mo and Ta. 5 ref. (P17d; SS, ST, Ti, Cu, Al, Mo, Ta)

**347-P.** The Magnetic Susceptibility and Electrical Resistivity of Some Transition Metal Silicides. D. A. Robins. *Philosophical Magazine*, v. 3, Apr. 1958, p. 313-327.

18 ref. (P15g, P16)

**348-P.** Galvanomagnetic Effects in n-Type Indium Antimonide. H. P. R. Frederikse and W. R. Hosler. *Physical Review*, v. 108, Dec. 1, 1957, p. 1136-1145.

(P16, P15; In, Sb, 14-68)

**349-P.** Galvanomagnetic Effects in p-Type Indium Antimonide. H. P. R. Frederikse and W. R. Hosler. *Physical Review*, v. 108, Dec. 1, 1957, p. 1146-1151.

36 ref. (P16, P15g; In, Sb, 14-68)

**350-P.** Superconducting Transition of Lead. W. B. Pearson and I. M.

Templeton. *Physical Review*, v. 109, Feb. 15, 1958, p. 1094.

(P15g; Pb)

**351-P.\*** Galvanomagnetic Effects in n-Type Bismuth Telluride. J. R. Drabble, R. D. Groves and R. Wolfe. *Physical Society Proceedings*, v. 71, Mar. 1, 1958, p. 430-443.

The resistivity, Hall coefficients and low-field magnetoresistance coefficients associated with current flow in the cleavage planes are measured at 77° K. on a number of n-type specimens of bismuth telluride. 7 ref. (P15, P16; Bi, Te, 14-68)

**352-P.\*** Magnetoresistance of n-Type InSb at 4.2° K. R. F. Broom. *Physical Society Proceedings*, v. 71, Mar. 1, 1958 p. 470-475.

Negative magnetoresistance in n-type InSb at 4.2° K. investigated for several specimens prepared by different techniques from single crystals of differing purity. Results indicate that this phenomenon is not a bulk property of the material but is largely due to the method of preparation of the specimens. Oscillations in the magnetoresistance as a function of magnetic field have been observed in samples having a balanced donor concentration of less than 10<sup>16</sup> cc. 9 ref. (P16, 2-63; In, Sb)

**353-P.\*** The Resistivity of Ordered Au-Cu. P. Wright and K. F. Goddard. *Physical Society Proceedings*, v. 71, Mar. 1, 1958, p. 506-508.

Isothermal decrease in resistivity with time at temperatures below 190° C. and an equilibrium resistance-temperature curve showing an increase in resistivity as the temperature approaches 190° C., followed by a decrease at lower temperatures. 7 ref. (P15g, 2-61; Au, Cu, 14-68)

**354-P.** Boltzmann Equation in the Theory of Electrical Conduction in Metals. D. A. Greenwood. *Physical Society Proceedings*, v. 71, Apr. 1, 1958, p. 585-596.

10 ref. (P15g)

**355-P.** The Thermal Conductivity of Tin-Indium Alloys in the Normal State. C. A. Shiffman. *Physical Society Proceedings*, v. 71, Apr. 1, 1958, p. 597-607.

19 ref. (P11h; Sn, In)

**356-P.\*** Electrical Conductivity and Thermo-Electric Power of Bismuth Telluride. H. J. Goldsmid. *Physical Society Proceedings*, v. 71, Apr. 1, 1958, p. 633-646.

Electrical conductivity and thermo-electric power of the semiconductor Bi<sub>2</sub>Te<sub>3</sub> measured between 150 and 300° K. Variation of carrier mobility with temperature; energy dependence of the relaxation time, as well as other semiconductor parameters. 25 ref. (P15g; Bi, Te, EG-j)

**357-P.\*** Properties of p-Type Indium Antimonide. Pt. 1. Electrical Properties. C. Hilsun and R. Barrie. *Physical Society Proceedings*, v. 71, Apr. 1, 1958, p. 676-685.

Dependence of electron and hole mobilities on carrier concentration is determined for p-type indium antimonide with impurity concentrations ranging from 10<sup>14</sup> to 2 x 10<sup>17</sup> cc. Method used was the analysis of variation of Hall coefficient and resistivity with a magnetic field. Good agreement is obtained with a simple theory, which assumes that the carrier relaxation time is independent of energy. 11 ref. (P15, In, Sb, EG-j)

**358-P.** The Thermal Conductivity of Lead at Low Temperatures. H. Montgomery. *Royal Society, Proceedings*, v. 244, Feb. 1958, p. 85-100. 27 ref. (P11h, 2-63; Pb)

**359-P.\*** The Surface Tension of the Binary Metal Alloys, Pb-Sn, Bi-Pb, Bi-Sn and Bi-Cd. R. V. Bakradze and B. Ya. Pines. *United Kingdom Atomic Energy Authority, AERE Lib/Trans*. 727, 1957, 12 p.

The concentration and temperature dependence of surface tension of liquid alloy systems Pb-Sn, Bi-Pb, Bi-Sn and Bi-Cd at temperatures up to 550° C. determined experimentally. Temperature dependence of all the alloys was practically linear. The concentration relation of surface tension, however, differed substantially from the linear. 5 ref. (P13h, 2-61; Pb, Sn, Bi, Cd)

**360-P.** Electrostatic Emission From a Tantalum Single Crystal. N. A. Gorbatiy, L. V. Reshetnikova, E. P. Sytaia and G. N. Shuppe. *Soviet Physics, Technical Physics*, v. 2, no. 2, 1957, p. 262-265. (Translation by American Institute of Physics, Inc.) 10 ref. (P15k; Ta, 14-61)

**361-P.** Recombination Centers in Germanium After "Low-Temperature" Heat Treatment. T. V. Mashovets and S. M. Ryvkin. *Soviet Physics, Technical Physics*, v. 2, no. 2, 1957, p. 210-212. (Translation by American Institute of Physics, Inc.) 8 ref. (P15, 2-64; Ge, Cu)

**362-P.** Probability of Recombination Capture of Charge Carriers by Frenkel Defects in n-Type Germanium. L. S. Smirnov and V. S. Vavilov. *Soviet Physics, Technical Physics*, v. 2, no. 2, 1957, p. 387-388. (Translation by American Institute of Physics, Inc.) 8 ref. (P15; Ge)

**363-P.** Investigation of the Mechanical and Magnetic Properties of Fe-Ni-Al Alloys for Permanent Magnets. A. A. Shekalov and Ya. I. Shtreis. *Metallovedenie i Obrabotka Metallov*, v. 4, Apr. 1958, p. 29-38. (Henry Brucher, Altadena, Calif., Translation no. 4185.)

The mechanical properties of the ternary Fe-Ni-Al alloys and quaternary alloys with Cu and the effect of sulphur, Ti and Li additions on the mechanical and magnetic properties of these alloys were studied with the aid of microscopic analysis and rupture, bending and hardness tests. 4 ref. (P16, Q-general; SGA-n)

**364-P.** Physico-Chemical Analysis of Some Semiconductor Systems. N. Kh. Abrikosov. *Academy of Sciences of the USSR, Bulletin of*, v. 21, no. 1, 1957, p. 136-139. (Translation by Columbia Technical Translations, Inc.)

Study of Cr-Sb, Co-Sb, Fe-Si and Bi-Te semiconductor systems in wide range of concentrations and after various heat treatments. 10 ref. (P15g; Cr-b, Sb-b, Co-b, Fe-b, Bi-b, Te-b)

**365-P.** (German.) Temperature Coefficient of the Initial Permeability of Powder Core Material. H. Henniger. *Nachrichtentechnik*, Feb. 1958, p. 66-75.

26 ref. (P11, P16; 6-72)

**366-P.** (German.) Chemical Problems in the Study of Semiconductors. Pt. 2. Germanium and Silicon. E. Gastinger. *Osterreichische Chemiker-Zeitung*, v. 59, Mar. 1958, p. 70-77. 84 ref. (P15g; Ge, Si)

367-P. (German.) **Magnetic Characteristics of Rare Earth Metals at Very Low Temperatures.** Hugo Leipfinger. *Zeitschrift für Physik*, v. 150, Mar. 10, 1958, p. 415-435.

46 ref. (P16, 2-63; EG-g)

368-P. (Japanese.) **Electrical Resistance of Dumet Wire.** Tetuya Arizumi, Totaro Haida and Yoichi Ueda. *Japan Journal of Applied Physics*, v. 27, Apr. 1958, p. 224-228.

The wire is assumed to consist of parallel resistances of Cu, brass and Ni-Fe alloy. The change of resistance of the wire by heat treatment is measured by means of a double bridge and potentiometer. 5 ref. (P15g, S11g, T1b; Cu, Cu-n, Fe, Ni, 4-61)

369-P. (Russian.) **Effect of Aluminum on Specific Losses of Transformer Steel.** N. F. Dubrov. *Stal'*, v. 18, Mar. 1958, p. 246-248.

Aluminum should not be added to transformer steel which is annealed at high temperature during either deoxidation or in alloying with ferrosilicon. 4 ref.

(P16; ST, Si, Al, SGA-n)

## Mechanical Properties and Tests

648-Q. **Creep Properties of Austenitic Nickel-Chromium Steels Containing Niobium.** W. H. Bailey, M. G. Gemmill, H. W. Kirby, J. D. Murray, E. A. Jenkinson and A. I. Smith. *American Society of Mechanical Engineers*, Paper no. 52-A-254, Dec. 1957, 9 p.

(Q3; SS)

649-Q. **Creep, Stress-Relaxation, and Metallurgical Properties of Steels for Steam Power Plant Operating With Steam Temperatures Above 950° F. (510° C.).** A. I. Smith, E. A. Jenkinson, D. J. Armstrong and M. F. Day. *American Society of Mechanical Engineers*, Paper no. 57-A-255, Dec. 1957, 24 p.

10 ref.

(Q3, Q-general, W11h; SS, 4-60)

650-Q.\* **Metallurgical Factors in the Design of Hydraulic Equipment for Elevated Temperature Application.** A. Mars and N. M. Lazar. *American Society of Mechanical Engineers*, Paper no. 58-AV-11, 1958, 8 p.

Short - time high - temperature strength, creep - rupture, creep strength, fatigue strength, stress relaxation, thermal stress fatigue, thermal expansion and wear resistance discussed for toolsteels, cast iron, titanium, aluminum and magnesium alloys. 12 ref. (Q-general, 2-62; TS, CI, Ti-b, Al-b, Mg-b)

651-Q. **The Case Against the Tension Test.** *Australasian Manufacturer*, v. 43, Apr. 1958, p. 52-57, 80-83.

Foundryman's case for the over-evaluation of wrought metals by the elongation and reduction of area features of the tension test. (Q27)

652-Q. **The Mechanical Wear of Metals.** W. Hirst. *British Journal of Applied Physics*, v. 9, Apr. 1958, p. 125-132.

Main phenomena, the laws and the mechanisms of wear in unlubricated conditions, and the present state of development of theories of wear. 28 ref. (Q9)

653-Q. **Deformation of Solids at High Rates of Strain.** A. H. Cottrell. *Chartered Mechanical Engineer*, v. 4, Nov. 1957, p. 448-460.

44 ref. (Q24)

654-Q.\* **Carbon-Manganese Steel.** J. Glen. *Iron and Steel*, v. 31, May 1958, p. 165-171.

Proof stress tests carried out at temperatures up to 450° C. on carbon-manganese steel in as-rolled condition, in normalized condition or after tempering for 2 hr. at 650° C. Steels were basic open-hearth, silicon killed or aluminum killed. Effect of Mn on proof stress values; relationship between proof stress at high-temperature and room temperature tensile strength; effect of silicon killing, yield phenomena, normalizing, microstructure on proof stress. (Q23b, Q27a, T26q, 2-60, 2-61, 2-64; ST-c, ST-e, 4-53)

655-Q.\* **Effect of Phosphorus on the Tensile and Notch-Impact Properties of High-Purity Iron and Iron-Carbon Alloys.** B. E. Hopkins and H. R. Tipler. *Iron and Steel*, v. 31, May 21, 1958, p. 263-274.

Two important effects of adding phosphorus to iron are the much greater strengthening than obtained by comparable amounts of metallic alloying elements, and the progressive development of grain-boundary weakness which can be modified by heat treatment. For phosphorus contents above 0.05%, the transition temperatures in the Charpy impact test were high as a result of the enhanced yield stress and the reduction in brittle fracture stress arising from the weakening of the grain boundaries. (Q27a, Q6n, 2-60; CI, Fe-a, P)

656-Q. **Creep of Pre-Strained Aluminum.** *Metal Industry*, v. 92, May 23, 1958, p. 432, 434.

(Q3; Al)

657-Q. **Work-Hardening and the Initiation and Spread of Fatigue Cracks.** N. F. Mott. *Royal Society, Proceedings*, v. 242, Oct. 29, 1957, p. 145-147.

(Q7, Q23a, 9-72)

658-Q. **The Mechanism of Work-Hardening and Slip-Band Formation.** J. Friedel. *Royal Society, Proceedings*, v. 242, Oct. 29, 1957, p. 147-159.

36 ref. (Q24c, Q23a, Q7)

659-Q. **The Energy Stored in Fatigue of Metals.** L. M. Clarebrough, M. E. Hargreaves and G. W. West. *Royal Society, Proceedings*, v. 242, Oct. 29, 1957, p. 160-166.

7 ref. (Q7)

660-Q. **Hardening and Softening of Metals by Cyclic Stressing.** T. Broom and R. K. Ham. *Royal Society, Proceedings*, v. 242, Oct. 29, 1957, p. 168-179.

New investigations of the hardening produced in annealed polycrystalline Cu and Al by alternating stresses applied at a frequency of 100 cycles per sec. and of such magnitude as to give complete fatigue failures in  $2 \times 10$  cycles. 29 ref. (Q7, Q29)

661-Q. **The Initial Fatigue Crack.** G. C. Smith. *Royal Society, Proceedings*, v. 242, Oct. 29, 1957, p. 189-197.

Formation of persistent slip bands during cyclic stressing and their development into fatigue cracks. In Cu and Al at low temperatures fatigue cracks appear to be formed in this way; at room temperature in Al they may form also along grain boundaries. 4 ref. (Q7; Cu, Al)

662-Q. **Slip-Band Damage and Extrusion.** P. J. E. Forsyth. *Royal Society, Proceedings*, v. 242, Oct. 29, 1957, p. 198-202.

Slip-band extrusion was first observed in a fatigued 4% Cu aluminum alloy, but has now been found to occur in many other materials. It takes the form of a thin ribbon or scroll of the crystal material projecting as much as  $20\mu$  from the slip band. The thickness of the ribbon varies with different materials and fatigue conditions, that observed on the above alloy being less than  $0.1\mu$ . 6 ref. (Q24a)

663-Q. **Extrusion and Intrusion by Cyclic Slip in Copper.** A. H. Cottrell and D. Hull. *Royal Society, Proceedings*, v. 242, Oct. 29, 1957, p. 211-213.

Extrusions and intrusions observed on slip bands in Cu fatigued at 300.90 and 20° K. A model based on a sequence of slip movements during a fatigue cycle is proposed to explain their formation. 4 ref. (Q24c; Cu)

664-Q. **Some Observations on the Spread of Fatigue Cracks.** N. E. Frost and C. E. Phillips. *Royal Society, Proceedings*, v. 242, Oct. 29, 1957, p. 216-222.

Fatigue cracks after the stage of initiation; conditions under which continuous propagation does not occur. 13 ref. (Q7, Q26q)

665-Q. **Speed Effect in Fatigue.** P. G. Forrest. *Royal Society, Proceedings*, v. 242, Oct. 29, 1957, p. 223-227.

It is usually found that the fatigue strength of metals is slightly reduced by decreasing the cyclic speed, the reduction becoming greater with increase in temperatures between 200 and 300° C. In this range the fatigue strength is considerably greater at 10 cycles per min. than at 2000 cycles. It is thought that this behavior is caused by strain aging. 8 ref. (Q7, N7e)

666-Q\* **Plastic Deformation of Nickel Single Crystals at Low Temperatures.** Peter Haasen. *University of Chicago, Institute for the Study of Metals, 48th Quarterly Report*, Pt. 1, Mar. 1958, 39 p.

Single crystals of Ni (purities of 99.98% and 99.4%) were deformed in tension at various temperatures between 4.2° K and 300° K. Shear stress-shear strain relations determined as well as reversible change of flow stress with temperature. Work hardening parameters discussed in terms of dislocation theory that has been developed mainly on the basis of data on Al and Cu. 42 ref. (Q23a, Q2, 2-63; Ni, 14-61)

667-Q.\* **Charpy Brittle-Fracture Transitions by the Lateral Expansion Energy Relationship.** George M. Orner. *Welding Journal*, v. 37, May 1958, p. 201s-205s.

Brittle fracture transition temperature corresponding to a discontinuity in fracture versus lateral expansion relation correlates with low-low transition temperature provided effect of adiabatic temperature rise is taken into consideration. (Q6, Q23r, Q26s, 2-61; AY)

668-Q.\* **A Unique Machine for Large Scale Fatigue Testing.** H. V. Cordiano. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 3-20.

Machine of vibratory type; disturbing force consists of an alternating couple developed by two sets of rotating eccentric disks on parallel shafts rotating in the same direction 180° out of phase. Absorber consists of weighted test specimen subjected to bending load. Results of fatigue tests on riveted and welded steel plate. 10 ref. (Q7e, 1-53; ST, 4-53, 7-51, 7-53)

**669-Q.\* Torsional Fatigue Testing of Axle Shafts.** E. J. Eckert. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 21-36.

Construction and operation of hydraulic nonresonant constant-load machine for performing unidirectional torsional fatigue tests on axle shafts up to 4 in. in diameter. Effects of inclusions, straightening, shock peening and hardness profile on fatigue strength of SAE 86B45H and 4150 steels. (Q7h, 1-53, T7j; AY)

**670-Q.\* Fatigue Testing of Airframe Structural Components.** H. W. Foster. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 37-58.

Points to be considered in laying out simulated service fatigue tests of components. Tests of primary wing service structure, landing gear, secondary and equipment structure subjected to high-cycle loading. Reliability of data obtained from tests of single components. 9 ref. (Q7, 1-54, T24a)

**671-Q.\* Fatigue Performance of Marine Shafting Laboratory and Service Tests.** T. W. Bunyan. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 59-80.

Arrangement and operation of fatigue machine designed to test steel shafts 5½ to 10 in. in diameter under repeated reversed torsional loading. Results of tests on shafts of acid openhearth carbon steel. Effects of notches or pellets on torsional fatigue strength. Service failure of tail shafts. 4 ref. (Q7h, 1-53, T7j; ST-e, 1-64)

**672-Q.\* Fretting Corrosion of Large Shafts as Influenced by Surface Treatments.** Oscar J. Horger and H. R. Neifer. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 81-95.

Rotating bending fatigue tests on 79/16-in. diameter normalized and tempered 0.5% plain carbon steel shaft forgings having a press-fitted outer disk member. Disk seat of some assemblies was Cr plated; others phosphate coated. Fatigue resistance improved by Cr plating, but little by phosphate coating. Information on surface rolling of 27-in. propeller shafts. 11 ref. (Q7c, R1f, T7j; CN)

**673-Q.\* Fatigue Tests of Large Alloy Steel Shafts.** F. C. Eaton. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 96-106.

Fatigue tests on 9-in. diameter un-notched and 8½ in. diameter notched shafts of alloy steels with about 0.2% C, 2.8% Ni, 0.3% Cr, 0.35% Mo, and 0.06% V. Tests were made in rotating-beam type machine in which load is applied to shaft by misalignment of the bearings. Comparison to results obtained with small-diameter specimens of similar compositions. 4 ref. (Q7c, T7j; AY)

**674-Q.\* Influence of Operating Experience and Full Scale Tests on Propulsion Shafting.** Design of U. S. Navy Ships. Rudolph Michel. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 107-131.

Causes and characteristics of failures in shafting. Evaluation of static and dynamic forces acting on shafting; use of fillets for reducing stress concentration; protection against corrosion; design of shafting. 16 ref. (Q7, T7j; 17-51)

**675-Q.\* Sudden Fracture of Machine Parts and Structure Elements.** G. V. Uzhik, M. J. Galperin and A. A. Zooykova. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 132-141.

Static loading resulted in brittle fracture even when zone of fatigue fracture comprised only 0.12 of cross section. Brittle fracture also occurred in plates with notches of small radius under static loading. Notched plates of carbon steel of various thicknesses were tested in tension and under static bending to determine thickness at which transition from two-dimensional to three-dimensional stress state and transition of ductile to brittle failure occurred. (Q7, Q26s; CN, 4-53)

**676-Q.\* Determination of Dynamic Loading in Full Size Fatigue Tests and Some Results.** S. V. Serensen and M. E. Garf. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 142-151.

Classification of fatigue machines according to their dynamic performance. Dynamic arrangements of bending machine and results of fatigue tests on cast iron and carbon steel crankshafts and large specimens subjected to constant and varied bending moment amplitudes. 9 ref. (Q7g, 1-53; T7j; CI, CN)

**677-Q.\* (English.) Influence of Surface Roughness on the Mechanism of Contact Between Metal Surfaces.** Tadasu Tsukizoe and Susumu Kikuchi. *Osaka University, Institute of Polytechnica, Journal*, v. 3, Mar. 1958, p. 1-6.

5 ref. (Q9p, S15)

**678-Q.\* (English.) Mechanical Properties Caused by Low-Temperature Annealing of Cold Worked Pure Iron.** Jiro Soga and Toichi Watanabe. *Osaka University, Institute of Polytechnica, Journal*, v. 3, Mar. 1958, p. 35-44.

10 ref. (Q-general, J23; Fe-a)

**679-Q.\* Some Correlations Regarding the Mechanical Strength of Materials Obtained by Sintering of Powdered Metals. Pt. 3. Case When Powder Mixtures Contain Easily Fusible Components.** B. Ia. Pines, A. F. Sirenko and N. I. Sukhinin. *Soviet Physics, Technical Physics*, v. 2, 1958, p. 1773-1779. (American Institute of Physics, Inc.)

The mechanical strength of single-phase pressings of the powder of a plastic metal (Cu) heated at a high temperature (1000° C.) decreases with increase of porosity over a wide range (0.40%), which is to be expected, considering the weakening of the cross section. At the same time the strength depends only on the final porosity (obtained after heating) and is independent of the initial porosity (dependent on compression). For a given final porosity a slight dependence of strength

on the granular condition of the powder is observed. 4 ref. (Q27a, H11n; Cu)

**680-Q.\* (German.) Influence of Cold Forming on the Damping of Iron-Chromium Alloys.** Karl Bunhardt and Hans Preisendanz. *Archiv für das Eisenhüttenwesen*, v. 29, Apr. 1958, p. 241-247.

Effect of cold forming on damping maximum at 220 and 600° C. in case of pure Fe, pure Cr and Fe-Cr alloys with 6-45% Cr. Relationship between damping, grain size and recrystallization temperature. Alteration of grain-boundary toughness caused by nitrogen absorption. (Q8; Fe, Cr)

**681-Q.\* (German.) Evaluation of Stresses in Gear Teeth on the Basis of Optical Measurements.** H. Glaubitz. *Werkstattstechnik und Maschinenbau*, v. 58, Apr. 1958, p. 216-222.

Study of stresses in gear teeth by taking isochromatic pictures. Experimental conditions. Preparation of specimens. Estimation of stresses by comparison of measured and calculated stresses. (Q25, T7a, 1-53)

**682-Q.\* (German.) Effect of Hydrogen on Fatigue Behavior of Titanium.** Kurt Claus. *Zeitschrift für Metallkunde*, v. 49, Apr. 1958, p. 201-205.

Effect of hydrogen on tearing strength of notched and smooth specimens. Effect on fatigue strength and creep resistance. Accelerated hydride precipitation caused by tension stress. (Q7, 2-60, Q3; Ti)

**683-Q.\* (Russian.) Metallurgical Study of the Influence of Predeformation at Different Temperatures on the Plastic Deformation of Aluminum Single Crystals.** L. I. Vasil'ev, Ch'en Lin-chao and Yang Ta-yu. *Scientia Sinica*, v. 8, no. 1, 1958.

Metallographic and electron microscope study of the influence of preliminary stretching upon the relief of single crystals of pure Al and their subsequent elongation under different conditions of temperature. Preliminary elongation at low temperature causes a number of peculiarities of the structure to appear in subsequent elongation at high temperature. The influence of high-temperature predeformation in subsequent low-temperature tests appears chiefly in the superposition of a superficial deformation relief. (Q24, M26c; Al, 14-61)

**684-Q.\* New Alloy Steels Beat Process Bugaboos.** R. E. Norden. *Chemical Engineering*, May 19, 1958, p. 180-184.

Four very-low-carbon grades of wrought stainless steel are commercially available today: an 18-8 Cr-Ni steel (304L); 18-8 with about 2.58% Mo (316L); 18-8 with about 3.5% Mo (317L); and a high-Mn, low-Ni grade (204L). Specific purpose in development was to provide an austenitic stainless steel of superior resistance to intergranular corrosion. (Q-general, R2h; SS)

**685-Q.\* Surface Structure of Slip Bands on Copper Fatigued at 293°, 90°, 20°, and 4.2° K.** D. Hull. *Institute of Metals, Journal*, v. 86, May 1958, p. 425-430.

Slip bands produced during fatigue deformation of high-purity Cu at temperatures between 293 and 4.2° K. studied with optical and electron microscopes. Replicas of the surface reveal the changes in contour within individual slip bands, above and below the surface. Ex-

trusions and intrusions are formed in the slip bands at all temperatures of testing, and their formation is not suppressed at 4.2° K. 17 ref. (Q24a, Q7; Cu-a)

**686-Q.\* Some Effects of Mechanical Working on the Deformation of Nonmetallic Inclusions.** F. E. Pickering. *Iron and Steel Institute, Journal*, v. 189, June 1958, p. 148-159.

Effect of temperature and extent of hot working upon deformation characteristics. At high temperatures siliceous inclusions deform and elongate prior to fracturing, but at lower temperatures they fracture with little or no deformation. Concluded that fracture of the inclusions is necessary to disperse the larger detrimental inclusions into smaller, less harmful particles. 5 ref. (Q24; ST, 9-69)

**687-Q.\* Uncommon Metals Ready to Solve Difficult Problems.** J. P. Denney and L. F. Kendall. Digest of paper presented before Design Engineering Conference, Chicago, Apr. 1958. *Metal Progress*, v. 73, June 1958, p. 136, 138, 140, 142, 144, 146, 148.

Zirconium, hafnium, vanadium, columbium, tantalum, chromium and rhenium, now available at least in development quantities, are finding applications formerly unknown. Properties and prices. (Q-general, P-general; SGA-g, SGA-h, Cr, Ch, Ta, V, Zr, Hf)

**688-Q. Regularities in Creep and Hot-Fatigue Data. Pt. 2.** K. F. A. Walles and A. Graham. *National Gas Turbine Establishment, Report no. R.190*, Dec. 1956, 144 p.

Creep-rupture, creep rate and hot fatigue data for 44 materials considered theoretically. (Q3, Q7, 2-62)

**689-Q.\* The Mechanical and Engineering Properties of Commercially Available Titanium Alloys.** H. V. Kinsey. *North Atlantic Treaty Organization Advisory Group for Aeronautical Research and Development, Report 100*, 1957, 15 p.

Lists the Ti alloys produced on a commercial basis up to early 1957; nominal chemical compositions and manufacturer's designations; physical, mechanical and engineering properties. Those properties required by the aeronautical design engineer that are not available. (Q-general; Ti-b)

**690-Q.\* Statistical Aspect in Accelerating Creep and Creep Fracture of OFHC Copper.** Takeo Yokobori. *Physical Society of Japan, Journal*, v. 13, Mar. 1958, p. 305-312.

A large number of creep-rupture tests on OFHC Cu wire have been carried out at stress levels of 24.0 to 25.0 kg. per sq. mm. and temperatures of 8 to 40° C. The F-test was made for the differences in variance between time for initiation of accelerating creep and time for rupture measured from the initiation of accelerating creep, and the regression analysis between these times was carried out. 10 ref. (Q3, S12; Cu-a)

**691-Q.\* Annealed Metals Under Alternating Plastic Strain.** W. A. Wood and R. L. Segall. *Royal Society, Proceedings*, v. 242, Oct. 29, 1957, p. 180-188.

Annealed Cu, Ni, Al and alpha brass were subjected to cycles of small alternating torsion in which the amplitude of plastic strain was held constant; proof stresses re-

quired to impose the successive reversals of strain were measured. Variations in this proof stress, which shows how the metal strain-hardens at each amplitude, are correlated with structural changes shown by X-ray diffraction and metallographic examination. 19 ref. (Q7, Q1; Cu, Al, Ni)

**692-Q. Fatigue and Ultimate Tensile Strengths of Metals Between 4.2 and 293° K.** R. D. McCommon and H. M. Rosenberg. *Royal Society, Proceedings*, v. 242, Oct. 29, 1957, p. 203-211.

Fatigue of Cu, Ag, Au, Al, Mg, Zn and Fe has been investigated at 4.2, 20, 90 and 293° K. Except for Zn and Fe, which exhibit brittle fracture at low temperatures, fatigue characteristics improve considerably as the temperature is reduced. Ultimate tensile strength was measured at each temperature and showed a marked correlation to the increase in fatigue strength at low temperatures. Results with reference to current ideas on the mechanism of fatigue. 10 ref. (Q7, Q27a, 2-63; Ag, Al, Au, Cu, Fe, Mg, Zn)

**693-Q.\* On the Ductility of Polycrystalline Beryllium.** J. F. W. Bishop. *United Kingdom Atomic Energy Authority, IGR-Tn/S-791*, Feb. 1958, 12 p.

The elongation to failure of single and polycrystalline specimens of Be is markedly correlated with crystal and grain orientations, varying from virtually zero to tens of percent. Anomalous ductility of the metal under time independent straining conditions can be rationalized on the basis of the great resistance to compressive deformation normal to the basal plane offered by the crystals at temperatures below 100° C. Directional ductility can in principle be induced in the metal to meet specific requirements. 6 ref. (Q23p; Be)

**694-Q. Room Temperature Deformation Process in Zirconium.** E. J. Rappaport. *Nuclear Metals, Inc. U. S. Atomic Energy Commission, NMI-1199*, Feb. 24, 1958, 24 p. (Order from Office of Technical Services, Washington 25, D. C.) \$7.50.

Work performed on single crystals and on large-grained samples of relatively high purity. Iodide crystal-bar Zr was used, some samples being made from arc-melted stock, and some from the crystal bar as grown. Two methods of crystal production were employed. One was to maintain the samples at 840° C. in vacuo for eight to ten days; the other was to cycle the samples two or three times between 1200 and 840° C., remaining at the higher temperature for about 4 hr., and at the lower for five days. The only slip system observed was {1010} [1210] with a critical resolved shear stress for slip of about 0.65 kg. per sq. mm. in compression. The active twin planes were {1012}, {1121}, {1122}, and {1123}. 18 ref. (Q24; Zr, 14-61)

**695-Q. Plastic Strain Absorption as a Criterion for High Temperature Design.** C. R. Kennedy and D. A. Douglas. *Oak Ridge National Laboratory, U. S. Atomic Energy Commission, ORNL-2360*, May, 1958, 25 p. (Order from Office of Technical Services, Washington 25, D. C.) \$1.

Test apparatus is capable of mechanically cycling a specimen in tension and compression within set

strain limits. Data confirm Coffin's theory that total plastic strain per cycle can be used to predict the number of cycles to failure. Evidence that Inconel strain weakens at the test temperature; grain size found to be the most important variable affecting the behavior of materials subjected to strain reversals. (Q23, 1-53, 2-59; Ni-b)

**696-Q.\* Fatigue and Ultrasonic Attenuation.** Rohn Truell and Akira Hikata. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 63-70.

Attenuation as a function of the number of cycles in tension or in tension and compression. Results of these measurements in 2S, 24ST-4 and 75S Al. (Q7, 1-74)

**697-Q.\* Studies of Type 301 Stainless Steel Columns.** Julien Dubuc, V. N. Krivobok and Georges Welter. Paper from "Metals", ASTM STP No. 196, p. 1-21.

Creep or cycling the applied load has no effect on the final stress-strain compression curve; however, the stress-strain relationship in the column after previous stressing and then relieving the stress to zero is entirely different from the original relationship. Beneficial effects of heat treatment at relatively low temperatures. 4 ref. (Q28k, 2-64; SS)

**698-Q.\* Effect of Forming on Mechanical Properties.** J. L. Waisman and C. S. Yen. Paper from "Metals", ASTM STP No. 196, p. 33-44. (Also appears in "Fatigue of Aircraft Structures", ASTM STP No. 203, p. 67-78.)

Effects of stretching and bending on the static and fatigue strengths of sheet metals were determined experimentally on several aluminum alloys, commercial pure titanium and Type 302 stainless steel. These effects can be explained or predicted by considering the effect of three factors; strain hardening, micro-residual stress, and macro-residual stress. (Q7a, Q27a, 3-68; Al, Ti, SS, 4-53)

**699-Q.\* Axial Stress Fatigue, Creep, and Rupture Properties of Unnotched and Notched Specimens of Heat-Resistant Alloys.** F. H. Vitrovec and B. J. Lazan. Paper from "Metals", ASTM STP No. 196, p. 45-62.

Fatigue, rupture and creep data at various temperatures obtained under various combinations of mean and alternating stress for Stellite 31, Waspalloy (6.3% Mo), Inconel X-550, Timken 16-25-6, Lapelloy, and stainless steel Type 403. Data are presented as stress range diagrams to show effect on the fatigue and creep properties of specimen notch, temperature, ratio of alternating-to-mean stress, and stress magnitude. 11 ref. (Q7, Q3m; SGA-h, SS, Co, Ni)

**700-Q.\* Determination of Young's Modulus Under Conditions of Relaxation.** Raymond W. Fern. Paper from "Metals", ASTM STP No. 196, p. 63-76.

Equipment for determination of Young's modulus in Mg alloys; methods for obtaining improved axial alignment. Statistical analyses show effect of five methods of gripping specimens on the apparent Young's modulus and the degree of misalignment. 4 ref. (Q21a, 1-53; Mg)

**701-Q.\* Effect of a Number of Variables on the Fatigue Properties of High-Strength Steels.** G. Sachs, B. B. Muvdi and E. P. Klier. Paper from

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"Metals", ASTM STP No. 196, p. 77-93.

Fatigue tests were performed on specimens machined from 3 to 4½-in. round or square steel sections subsequently heat treated. Steels were aircraft quality 4340, 93B40, V-Mod, 4330, Hy-Tuf and Super Hy-Tuf. Variables studied were specimen position in the steel section, as-processed section size, strength level or tempering temperature, stress concentration, and fibering or directionality. 10 ref. (Q7; AY, SGB-a)

**702-Q.\* The Effect of Temperature, Frequency, and Grain Size on the Fatigue Properties of High-Purity Aluminum.** N. H. G. Daniels and John E. Dorn. Paper from "Metals", ASTM STP No. 196, p. 94-110.

At room temperature the fatigue strength of high-purity Al approaches a lower limiting value in accord with the usual observations on nonferrous metals. At 250° C. fatigue strength continues to decrease abruptly with increasing cycles of stress without exhibiting any trend toward reaching a limiting value even at 10<sup>7</sup> cycles; finer grain-sized specimens exhibit higher fatigue strength at 250° C. 16 ref. (Q7a, 2-61, 2-59; Al-a)

**703-Q.\* Determination of Fatigue-Crack Initiation and Propagation in a Magnesium Alloy.** R. B. Clapper and J. A. Watz. Paper from "Metals", ASTM STP No. 196, p. 111-122.

Rotating-beam fatigue tests were carried out on AZ63A-T4 Mg alloy to determine the initiation and propagation characteristics of a fatigue crack. An electric resistance method for measuring cracks non-destructively was developed. No relationship was apparent between life before crack initiation and life after initiation. 10 ref. (Q7, Q26; Mg)

**704-Q.\* Uni-Directional Axial Tension Tests of Beryllium Copper and Several Precipitation Hardening Corrosion-Resistant Steels.** M. H. Weisman, J. Melill and T. Matsuda. Paper from "Metals", ASTM STP No. 196, p. 123-142. (Also appears in "Fatigue of Aircraft Structures", ASTM STP No. 203, p. 47-66.

Results of notched tensile tests and smooth and V-notched fatigue tests are reported for beryllium copper, AM350 corrosion-resistant steel, and A-286 heat and corrosion resistant steel, and for open-hole notched specimens of 17-7PH corrosion-resistant steel. Cyclic loading tests also are reported for dimpled and riveted sheet specimens of AM350 steel which simulate typical single-lap riveted aircraft joints. Other tests are reported for 17-7PH steel specimens containing unloaded rivet-filled holes. (Q7; Cu, Be, SS)

**705-Q.\* The Properties of Beryllium Copper Strip as Affected by Cold Rolling and Heat Treatment.** John T. Richards and Ellsworth M. Smith. Paper from "Metals", ASTM STP No. 196, p. 143-156.

Tension and hardness tests to determine the influence of cold rolling and precipitation hardening; also effect of Be content, strip thickness and structure. New age-hardening treatments for maximum strength and hardness are proposed. 11 ref. (Q27a, Q29n, 2-64, 3-68, J27; Cu-b, Be)

**706-Q. Full Scale Wing Fatigue Testing.** A. R. Vollmecke. Paper from "Fatigue of Aircraft Structures",

ASTM STP No. 203, p. 1-9.

Tests currently being run at Convair. (Q7k, T24a)

**707-Q.\* Riveted Joints Fatigue Strength.** C. R. Smith and G. D. Lindeneau. Paper from "Fatigue of Aircraft Structures", ASTM STP No. 203, p. 10-28.

Fatigue strength of riveted joints is affected by following variables: residual stress due to riveting; stress due to load per rivet; bending stress caused by eccentric loading; stress due to load passing onto other rivets. (Q7; 7-53)

**708-Q.\* The Rehabilitation of Fatigue-Wear Structure.** J. P. Butler. Paper from "Fatigue of Aircraft Structures", ASTM STP No. 203, p. 29-46.

Initial fatigue cracks in Al aircraft structures are of local nature in typical structural joints studied. Fatigue cracks at fasteners were reliably discovered by visual inspection with only small-power magnification. Careful inspection practices, the removal of 0.030 in. of material in the hole beyond the last visual traces of the fatigue crack effectively removes fatigue damaged material and provides an extended service life for the joints. 9 ref. (Q7, T24a; Al)

**709-Q.\* Fatigue Testing of Airframe Structural Components.** H. W. Foster. Paper from "Fatigue of Aircraft Structures", ASTM STP No. 203, p. 79-100.

Typical airframe component tests illustrated and discussed, including tests of primary wing surface structure, landing gear, and secondary and equipment structure subjected to very high cycle loadings. 9 ref. (Q7, T24a, 1-54)

**710-Q. Summary of Strength Limitation Phenomena.** George Sachs. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 11-35.

Effect of carbon content, hydrogen and oxygen on tensile strength, yield strength and ductility of constructional steel. 13 ref. (Q27a, Q23p, Q23b, 2-60; ST, SGB-s)

**711-Q. Dislocations and Strength.** P. B. Hirsch. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 36-70.

Current theories on plastic deformation. Yield stress of a metal is determined by two factors; the elastic interactions between the dislocations which must be overcome before the dislocations move, and the "frictional force" on the dislocations on account of the presence of jogs, or because of the difficulty of cutting through other dislocations. 19 ref. (Q24, M26b)

**712-Q. Effects of Grain Size, Solid Solution and Other Metallurgical Factors on Strength.** Earl R. Parker. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 71-83.

To harden a metal it is necessary to introduce many barriers which are either impermeable to dislocations or through which dislocations can pass only at high stress levels. There are several very effective bar-

riers, namely grain boundaries, clusters of solute atoms, precipitated particles and piles of tangled dislocations. Effect of each of these. 8 ref.

(Q27a, Q29n, M26b, N-general)

**713-Q. Dependence of Strength on Loading Speed and Loading Time.** D. S. Wood. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 103-124.

The effect of rate and time of loading on the conventional stress-strain characteristics; influence of wave propagation phenomena. 7 ref. (Q25n)

**714-Q. Strength Limitations Under Repeated Load.** Elio D'Appolonia. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 125-142.

Tests on rotating-beam specimens of 75A Ti alloy at high stress levels show a pseudo-elastic behavior for a portion of their fatigue life. Stress-strain relation during cyclic loading is the same as the linear portion of the stress-strain curve obtained by static loading. Continuous time records of the mid-span deflection and the torque necessary to turn a rotating-beam fatigue specimen at constant speed were used to study damage produced by plastic deformations. 8 ref. (Q7, Q25n; Ti)

**715-Q. Effect of Section Size on Fracturing.** J. D. Lubahn. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 143-161.

Size effect in mild steel has to do with the mode of crack propagation. In larger specimens, sudden cleavage fracture sets in after a smaller amount of gradual tearing than in smaller specimens. There is a size effect on strength and ductility, in addition to the effect on mode of crack propagation, in certain heat treated steels and high-strength Al alloys. The size effect is more pronounced for sharper notches or for harder metal. 11 ref. (Q26, 3-73; CN)

**716-Q. Effects of Stress Concentrations and Residual Stresses.** Oscar Hoffman. Paper from "Proceedings of the Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 162-178.

Problems that arise in connection with the employment of large forgings of high-strength alloys in aircraft structures and specifically in aircraft landing gears. Behavior of a structural alloy in an area of stress concentration depends upon its ductility (i.e., on the amount of plastic flow that can develop before fracture and modify the stress distribution in the sense of reducing stress peaks). (Q25; SGB-a)

**717-Q. Effects of Hydrogen on High-Strength Alloys.** Volker Weiss. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 179-203.

General effects of hydrogen in

steels and Ti alloys originating from both cell action and processing in hydrogen-containing environments. Effects of strain rate on hydrogen embrittlement were studied on 4340 steel. The notch-tensile test, which was earlier proven to be highly ductility-sensitive, was used. Similar effects were observed on Cu-plated low-alloy steels having strength levels below 200,000 psi. and on Ti. 9 ref.

(Q27, Q26s; AY, SGB-a, H)

**718-Q. Super-High Strength Steels for Aircraft Applications.** I. W. Sands. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 204-232.

Four steels of the ultra high-strength type used in current production airplanes: standard 4340, modified 4330 (Bendix-Republic AMS 6427) Hy-Tuf, another modification of the 4330 type originally designated TM-2 but now rechristened HS-220 (Timken). 7 ref.

(Q27a, T24a, 17-57; AY, SGB-a)

**719-Q. High Impact Strength Steels for Low-Temperature Service.** A. Hurlich. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 233-257.

Requirements of steels for ordnance application. Boron-treated alloy steels and use of rare earth additions to steel to improve ductility and low-temperature toughness at high strength levels.

(Q6n, Q23p, 2-63, T2, 17-67; AY)

**720-Q. Strength Limitations of High Strength Steels at Moderately Elevated Temperatures.** W. F. Brown. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 258-288.

Creep and high-temperature behavior of SAE 4340 (A), SAE 4340 (B), 17-22 A (S), AMS 5616, 17-4 PH, AISI 410, Inconel X, and A286. Optimum heat treatments. 23 ref.

(Q3, 2-62, J-general; AY, SS, Ni-b)

**721-Q. Onset of Fast Crack Propagation in High Strength Steel and Aluminum Alloys.** G. R. Irwin. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 289-305.

Various amounts of fracture extension force may be applied to a test specimen containing a crack and the response measured in terms of time rate of fracture extension. It is generally true that this extension rate changes from slow to fast for relatively small changes of the crack extension force. Therefore the critical values, thus determined, have a significance relative to resistance to fracturing similar to that of yield strength as a measure of resistance to yielding. 5 ref.

(Q26q; ST, Al, SGB-a)

**722-Q. Strength Limitations for Titanium Alloys.** S. V. Arnold. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 306-352.

Relation of strength-to-ductility and of strength-to-toughness. Of the binary systems, Ti-Mn, Ti-Mo and Ti-V show the most promise;

of the ternary systems, Ti-Al-Mn, Ti-Al-V, Ti-Mn-V and Ti-Mo-V show superiority. Alloys containing interstitial elements are inferior.

(Q27a, Q23; Ti-b)

**723-Q. Aluminum Alloys.** E. H. Dix. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 353-379.

Four classifications of Al alloys discussed: high-strength wrought alloys; some new permanent mold casting alloys having improved combinations of strength and ductility; alloys and products for elevated-temperature service; wrought non-heat-treatable alloys for welded structures. (Q27; Al)

**724-Q. High Strength Magnesium Alloys.** J. C. McDonald. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 380-398.

Factors involved in alloy development; principles of strengthening in Mg alloys; classes of alloys; extrusion and forging alloys; sheet alloys; casting alloys; alloys with maximum properties at elevated temperatures; design considerations. (Q27; Mg, SGB-a)

**725-Q. On the Change of Electrical Resistivity in Elementary Dislocation Generation.** E. D. Shchukin, V. N. Rozhanskii and Iu. V. Goriunov. *Soviet Physics (Doklady)*, v. 2, 1957, p. 420-422. (Translation by American Institute of Physics Inc.)

Experiments performed on single crystals of Cd (0.75 mm. diameter) and of Zn (0.5 mm. diameters), 15-20 mm. long, at room temperature with the initial angle 30° between the hexagonal axis and the direction of stretching. Stretching occurred under a constant load to 3-5% elongation at an average rate of (0.03-0.6) 10<sup>-4</sup> cm. per sec.; 1% stretching was ordinarily observed at intervals of 1 to 2 hr.

(Q24, P15g; Cd, Zn, 14-61)

**726-Q.\* (Japanese.) Effect of Manganese and Chromium on the Characteristics of Aluminum-Magnesium (3-5%) Alloys.** Pt. 3. Rihei Kawachi. *Light Metals (Tokyo)*, v. 8, Mar. 1958, p. 24-33.

Effect of Mn, Cr, Fe, Si, Cu, Zn and Ti on tensile properties and corrosion resistivity of sample (0.5 mm. thick) immersed in sea water with or without stress for up to 12 months shows Mn, Cr, Fe or Cu decrease sensitivity. Effect of Mg, Si, Cu, Zn or Ti on hot working temperature or the preheating characteristics of the ingot is not remarkable.

(Q27, R-general, 2-60; Al, Mg)

**727-Q. (Russian.) Relation Between Macro and Microhardness of Metals.** V. D. Lisitsyn. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 467-470.

Study of macro and microhardness of metals in original and deformed state with help of Volpert microtester. 10 ref. (Q29)

**728-Q. (Russian.) Application of Microhardness Test Methods to Determine Strength of Structural Steel After Riveting and Steels Hardened by Aging.** K. M. Pogodina-Alekseeva and E. E. Krotkova. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 470-473.

4 ref. (Q29q; ST, 2-64, 8-57)

**729-Q. (Russian.) Dynamic Method for Testing Modulus of Elasticity of Short Objects.** K. A. Bessonov and O. F. Stankevich. *Zavodskaya Lab-*

*oratoriya*, v. 24, Apr. 1958, p. 480-482. 4 ref. (Q21a, 1-54)

**730-Q.\* (Spanish.) Brittleness in Heat Treated Type F. 123. I.H.A. Nickel-Chromium Steel.** Justo Ferrer Flotats. *Instituto del Hierro y del Acero*, v. 11, Jan-Mar. 1958, p. 39-57.

Extraordinary brittleness in series of camshafts led to a study of samples of same type of steel from other sources. Desired degree of toughness can be obtained through proper temperature control during tempering and control of cooling speed. 28 ref. (Q26s, 2-14; AY)

**731-Q.\* Effect of Shot-Peening on Fatigue Strength.** R. P. Felgar. *American Society of Mechanical Engineers*, Paper no. 58-SA-46, 1958, 9 p.

Shot-peening introduces three effects: cold-working, residual stress, and stress concentrations. Relation of these effects to fatigue strength. Influence of the induced residual stress on the fatigue strength can be predicted theoretically. 19 ref. (Q7, G23n)

**732-Q.\* Distribution of Fatigue Failures in Flat Hardened Steel Test Bars.** W. S. Hyler, L. P. Tarasov and R. J. Favor. *ASTM, Preprint no. 69*, 1958, 11 p.

Locations of fatigue nuclei in flat hardened steel bars tested in cantilever bending were analyzed with respect to their distributions in the three principal directions. Mean longitudinal fracture location was near the maximum stress section; the location was relatively insensitive to grinding or tumbling conditions, relative stress level (ratio of applied stress to fatigue limit), and whether failure nucleated at or below the surface. 8 ref.

(Q7, G18, L10d; ST)

**733-Q.\* Torsional Fatigue Properties of Small Diameter High Carbon Steel Wire.** Harry C. Burnett. *ASTM, Preprint no. 70*, 1958, 11 p.

In general, there was no direct correlation between these properties and tensile strength of the wire. Comparison of a commercial cold drawn wire with wire from a vacuum-melted heat showed that the torsional fatigue life of cold drawn wire is decreased by the presence of inclusions. Oil tempered wire stressed in torsion is less susceptible to the initiation of longitudinal shear cracks than cold drawn music wire. Shot peening greatly increased the fatigue life of springs coiled from all three types of wire. 5 ref. (Q7h; CN-r, 4-61)

**734-Q.\* Effects of Grinding Direction and of Abrasive Tumbling on the Fatigue Limit of Hardened Steel.** L. P. Tarasov, W. S. Hyler and H. R. Letner. *ASTM, Preprint no. 71*, 1958, 11 p.

Although it has generally been assumed that parts ground transversely to the direction of applied stress would have a lower fatigue limit than those ground parallel to it, no such effect was found for two different grinding conditions. Abrasive tumbling was found to raise the fatigue limit to a moderate extent, whether the surface had been previously stressed in tension or in compression by grinding. The tumbled surfaces were stressed very highly in compression and the failures nucleated below the surface. 5 ref. (Q7a, G18, L10d; ST)

**735-Q.\* Evaluation of a Single-Shear Specimen for Sheet Material.** W. W. Breindel, C. L. Seale and R. L. Carlson. *ASTM, Preprint, no. 80*, 1958, 7 p.

- Single shear-type specimen which provides values of ultimate shear strength evaluated by tests on annealed and cold rolled Type 304 stainless steel, 2024-T3 Al alloy, and annealed 6Al-4V Ti alloy. 5 ref. (Q2, 1-60; SS, Al-b, Ti-b, 4-53)
- 736-Q.** Elastic-Plastic Analysis of Scabbing in Materials. Sudhir Kumar and Norman Davids. *Franklin Institute, Journal*, v. 265, May 1958, p. 371-383.
- "Scab" refers to the pieces of various shapes and sizes which fracture from a solid material when a sudden pressure of high intensity, such as an explosion, is applied. A bar of 14S-T4 Al alloy is investigated. 17 ref. (Q26, Al)
- 737-Q.\*** Hot Strength Properties of Filamentary Nickel Alloys. Bernard Wolk. *IRE Transactions on Electron Devices*, v. ED-5, no. 2, Apr. 1958, p. 58-65.
- Several Ni and Co base alloys (with such elements as Al, W, Cr) were tested for hot strength because of their possibilities as efficient primary electron emitters (when coated with alkaline earth oxides). Diameters of filaments were all 0.001 in. or less. (Q27a, 2-62; Ni-b, Co-b, 4-61)
- 738-Q.** Effects of Radiation Environment on Structural Metals. Alvin Boltax. *Electrical Manufacturing*, v. 61, June 1958, p. 125-133.
- 15 ref. (Q-general, 2-67, 17-51; SGB-s)
- 739-Q.** Evaluation of Niobium Alloys as High-Temperature Materials. W. S. Hazelton. *Machine Design*, v. 30, May 15, 1958, p. 150-152.
- Properties of columbium compared to those of established alloys to evaluate the metal as a structural material for high-temperature use. (Q-general, 17-57; Cb-b, SGA-h)
- 740-Q.** Thermal Stresses in Design. Pt. 1. Appraisal of Brittle Materials. S. S. Manson. *Machine Design*, v. 30, June 12, 1958, p. 114-120.
- Failure criteria, thermal shock in flat plates, thermal shock parameters. 7 ref. (Q10a, Q26s)
- 741-Q.** Manufacture of Pressure Vessels. H. Harris. *Nuclear Power*, v. 3, May 1958, p. 210-212.
- Problems of brittle fracture. (Q26s, T26q; ST)
- 742-Q.\*** Annealing in Slip Bands in Copper Fatigued at 90° K. D. Hull. *Philosophical Magazine*, v. 3, May 1958, p. 513-518.
- Number of slip bands formed during fatigue of O.F.H.C. copper compared at 90° K. and 293° K. For equivalent stresses to cause failure more slip bands are formed at 90° K. than at 293° K. The number of slip bands formed increases with the length of the test. 6 ref. (Q24a, Q7; Cu)
- 743-Q.\*** The Influence of Vacancies Upon the Internal Friction of Polycrystalline Copper. R. S. Barnes, N. H. Hancock and E. C. H. Silk. *Philosophical Magazine*, v. 3, May 1958, p. 519-526.
- Neutron irradiation, gamma irradiation and quenching all change the internal friction of pure polycrystalline rods of Cu. Only if the rods are initially given an anneal near the melting point for many hours do these three treatments give consistent and similar results, and then the logarithmic decrement is reduced. 16 ref. (Q22, 2-67; Cu-a)
- 744-Q.\*** The Effects of Neutron Irradiation Upon the Internal Friction of Copper Single Crystals at Liquid Nitrogen Temperatures. R. S. Barnes

- and N. H. Hancock. *Philosophical Magazine*, v. 3, May 1958, p. 527-530.
- The internal friction of Cu single crystals remains unaffected by a short neutron bombardment at -195° C. if no warning is allowed before measurement. Successive pulse anneals produce no marked change until 23° C. is reached, when the internal friction is greatly reduced. 6 ref. (Q22, 2-67, 2-63; Cu-a, 14-61)
- 745-Q.\*** New Coefficients Predict Wear of Metal Parts. Ernest Rabinowicz. *Product Engineering*, v. 29, June 23, 1958, p. 71-73.
- Effects of galling, poor oil, dust, surface cracks. Magnitude of wear can be predicted with simple general equations. Sliding may give one or a combination of four forms of wear: adhesive, abrasive, corrosive and surface fatigue. Wear coefficients can be read from a conversion chart when friction coefficient and velocity of sliding surfaces are known. Equations apply to adhesive and abrasive wear. No simple expression for corrosive wear has appeared and no clear-cut wear rate exists for surface fatigue. (Q9)
- 746-Q.\*** Analysis of Elasto-Plastic Behavior of Metals by Means of Photoelastic Coating Method. Kozo Kawata. *Scientific Research Institute, Journal*, v. 52, Mar. 19-8, p. 17-40.
- Thin films of photo-elastic material bonded to metal surfaces may provide a means of measuring the elasto-plastic strain distribution along the surface of metal. A new photo-elastic material, epoxy-poly-sulphide copolymer (epoxy rubber) is studied for use at room temperature. This polymer has suitable properties, such as large maximum elongation, low Young's modulus, high strain-optical sensitivity and high bonding strength to metal surfaces. 7 ref. (Q21, 1-54)
- 747-Q.** Some Properties of Neptunium Metal. *Soviet Journal of Atomic Energy*, v. 3, 1957, p. 956-957. (Translation by Consultants Bureau, Inc.)
- The ultimate tensile strength of neptunium, determined from the stress-strain curve and the empirical relationship between hardness and tensile strength lines within the limits of 124-138 kg. per sq. mm. (Q27, Q29; Np)
- 748-Q.** Relaxation of Nonoriented Microstresses. Pt. 2. B. M. Rovinskii and V. G. Liutsau. *Soviet Physics, Technical Physics*, v. 2, 1957, p. 2005-2008. (Translation by American Institute of Physics, Inc.)
- Curves obtained for the recovery of X-ray diffraction line breadth of plastically deformed pure metals (Al, Cu) at room temperature. Study shows that changes in the breadth of the lines with time are due basically to the relaxation of nonoriented microstresses. 8 ref. (Q24, Q25; Al-a, Cu-a)
- 749-Q.\*** Variables Affecting the Thermal Stability of Three Titanium Alloys. F. R. Schwartzberg, D. N. Williams and R. I. Jaffee. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 3-13.
- Effects of variations in stress, strain, time and temperature during thermal exposure on the tendency toward thermal instability in Ti-2Mo-2Cr-2Fe, Ti-6Al-4V, and Ti-4Al-4Mn alloys. Alloys were vacuum annealed and given a stabilizing heat treatment. None showed evidence of instability over a wide range of exposure conditions. Tests showed that a contaminated surface skin could lead to some embrittlement in

Ti-2Mo-2Cr-2Fe but not in Ti-6Al-4V or Ti-4Al-4Mn. (Q10a, 2-62; Ti-b)

- 750-Q.\*** The Effect of Temperature on the Uniform Elongation of Titanium Alloys. F. C. Holden, H. R. Ogden and R. I. Jaffee. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 14-31.
- Limits of uniform elongation were measured for typical alpha, alpha-beta and beta alloys in three microstructural conditions over a temperature range from -75 to 300° C. Highest uniform elongation was obtained for commercial Ti (alpha); low for the beta-quenched 7.5 Cr, 7.5 Mo alloy. Presence of massive alpha in the alpha-beta alloys increases their uniform elongation. Dependence on temperature is marked, particularly in the two-phase alloys. (Q27a, 2-61; Ti-b)
- 751-Q.\*** The Effect of Composition and Annealing Treatment on the Thermal Stability of Chromium-Molybdenum Alloys of Titanium. H. R. Ogden, F. C. Holden and R. I. Jaffee. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 32-47.
- Annealing treatments originating in the beta field produce a stable condition more rapidly than in the alpha-beta field. Instability in a 5% Cr alloy is related to the formation of eutectoid products. Substitution of Mo for half of the Cr retards the eutectoid reaction resulting in a more stable condition. Small additions of oxygen to the Cr-Mo alloys do not appear to affect stability. (Q10a, 2-60, 2-64; Ti-b, Cr, Mo)
- 752-Q.\*** Elevated-Temperature Properties of the 6 Per Cent Aluminum, 4 Per Cent Vanadium Titanium Alloys. W. M. Parris, R. G. Sherman and H. D. Kessler. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 48-64.
- Short-time tensile data at temperatures to 1000° F. Notched and unnotched stress-rupture data at 750, 850 and 900° F. for a mill-annealed condition and a high-strength heat treated condition. Creep test results including design curves showing 0.1, 0.2, 0.5, 1.0 and 5.0% creep at 650, 750 and 850° F. to 1000 hr. The 6 Al, 4 V alloy is metallurgically stable under stress to 950° F. and has good creep resistance to at least 850° F. (Q27a, Q3m, 2-62; Ti-b)
- 753-Q.\*** Development of Titanium Base Alloys for Elevated Temperature Applications. F. A. Crossley, W. F. Carew and H. D. Kessler. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 65-112.
- Tension, creep-rupture and stability test results. Survey of hot tensile properties of binary alloys indicated Al to be the best metallic strengthener on a weight per cent basis. Creep-rupture tests on 33 ternary alloys. Effect of additions of carbon, nitrogen and oxygen on creep-rupture properties. The most creep resistant alloy developed having good tensile ductility and stability is the 7 Al, 3 Mo alloy. 22 ref. (Q27a, Q3m, 2-62; Ti-b)
- 754-Q.\*** The Effects of Carbon and Nitrogen Contamination on the Notch Tensile Properties of Titanium. E. P. Klier and N. J. Feola. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 113-123.
- Notch sensitivity of unalloyed Ti as determined in the notch tension test differs from that measured in the Charpy V-notch impact test.

The ductile-brittle transition in the notch tension test occurs at a much lower testing temperature than for the impact test. At a testing temperature of  $-100^{\circ}\text{F}$ , neither 0.26% carbon nor 0.23% nitrogen leads to embrittlement in the notch tensile test. 9 ref. (Q23s, Q6, 2-63; Ti)

**755-Q.\* A Micro Notched-Bar Impact Test for Titanium Alloys.** F. C. Holden, H. R. Ogden and R. I. Jaffee. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 124-129.

Behavior of the micro-impact test compared with that of the V-notch Charpy test over a temperature range from  $-196$  to  $300^{\circ}\text{C}$ . for AISI 8745 steel, austenitized, 2017-T4 (17S) aluminum and 70-30 brass, both in the annealed condition, commercial Ti, and two Ti alloys (7 Mn and 4 Mn, 4 Al).

(Q6, 1-54; Ti, AY, Al, Cu-n)

**756-Q.\* The Measurement of Elastic Modulus of Titanium Alloys.** W. H. Graft and W. Rostoker. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 130-144.

Fundamentals of dynamic test methods; use of an electrostatic dynamic plastic modulus device. 6 ref. (Q21, 1-54; Ti-b)

**757-Q.\* Unalloyed Titanium Is Improving.** H. H. Barry and L. Schapiro. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 161-163.

Histogram of specification properties of yield strength, ultimate strength and elongation for 1000 consecutive sheets at Douglas Aircraft. (Q27a; Ti, 4-53)

**758-Q.\* Properties and Fabrication Characteristics of Wrought Titanium Products.** Leston B. Stark. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 170-182.

Mechanical property data and fabrication limits for Ti alloy sheet and extrusions; comments on forgings and their fabrication limits.

(Q-general, Q23q; Ti, 4-51, 4-53, 4-58)

**759-Q.\* Development of Standardized Specimen Preparation and Testing Techniques for Unalloyed Titanium Sheet.** R. L. Folkman and M. Schussler. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 183-196.

Variables in specimen preparation and testing techniques, and their effects on mechanical properties. Variables included melting (furnace pressure, atmosphere, electrode type and ingot size); rolling (sheet bar conditioning, hot rolling temperature); heat-treating (annealing temperatures and times); finishing (amount of surface removal by pickling); testing (strain rate and sample orientation).

(Q-general, 1-60; Ti, 4-53)

**760-Q.\* (Russian.) Peak of Internal Friction in High Chromium-Nickel Steel Associated With Hydrogen Diffusion Is Caused by Stresses.** Kun Chin-Pin and Ke Tin-Sui. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 82-90.

Preparation of sample, method of testing, and effect of hydrogenation and of de-hydrogenation, effect of various temperatures, measurement of energy of activation and evaluation of results.

7 ref. (Q22, 3-66; SS, H)

**761-Q.\* (Russian.) Investigation of Annealed Steel by Internal Friction.** I. N. Chernikova. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 102-105.

It was determined by torsional vibration that internal friction is related to various heat treatments of carbon steels of different carbon content. The frequency of specific vibration is about one Hertz. The peak at  $200^{\circ}$  may be characterized as a relaxation process attendant on the exit of carbon from solid solution of alpha iron during annealing. This peak rises with carbon content and lessens with temperature of annealing.

5 ref. (Q22, 2-64; CN)

**762-Q.\* (Russian.) Elongation Caused by Bending.** Yu. E. Bondarev. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 106-109.

Characteristic stretching properties of metals control their tendency toward stiffening and determine under various conditions the extent which their volume is changed. Metals with greater uniform elongation may be bent through a greater angle than those with less uniform elongation. Bending is limited to a large extent by the inability of the metal to elongate. 5 ref. (Q5)

**763-Q.\* (Russian.) Delayed Failure of Hardened Steels.** A. L. Nemchinskii. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 110-112.

Destructive extension of cracks begins when the tensile energy is suddenly released, grows into great force and is spent in expanding the crack. The resistance-time curve plotted from experimental results has two parts: inclined and horizontal. The inclined part seems to be determined by thermodynamics, and the horizontal by kinetics. 9 ref. (Q26; ST)

**764-Q.\* (Russian.) Influence of Ingot Weight on Quality of Structural Steels.** M. I. Kolosov, I. Ya. Aizenshtok, A. I. Komissarov, G. E. Mysina and M. S. Povolotskaya. *Stal*, v. 18, May 1958, p. 411-414.

Lower mechanical properties of larger ingots (intercrystalline cracking). (Q-general; ST, 5-59, 9-72)

**765-Q.\* (Russian.) Examination of Quality of Continuously Cast Transformer Steel.** N. M. Lopatyshskin, V. S. Rute and G. V. Gursky. *Stal*, v. 18, May 1958, p. 417-425.

Plasticity of steel at high temperature; surface properties of castings; cooling methods; macrostructure and microstructure; nonmetallic inclusions and chemical heterogeneity; rolling and heat treatment; physical and mechanical properties of sheets.

(Q-general, D9q; ST, SGA-n)

**766-Q.\* (Russian.) Influence of Aluminum Nitride on Quality of Cast Steel.** D. K. Butakov. *Stal*, v. 18, May 1958, p. 457-463.

Behavior of aluminum nitride in steels; experimental technique; experiments in quartz chamber; experiments with air blowing. Effect of casting method, cooling speed, annealing at high temperature and forging. Unfavorable influence of aluminum nitride on mechanical properties of steel and preventive measures. 7 ref.

(Q-general, 2-60; ST, 5-60)

**767-Q. Thermal Creep Design Criteria.** Robert Goldin. *Aeronautical Engineering Review*, v. 16, Dec. 1957, p. 36-41.

7 ref. (Q3, T24, 17-51)

**768-Q. Direct Stress Fatigue Tests on Redux-Bonded and Riveted Double Strap Joints in 10 S.W.G. Aluminum Alloy Sheet.** S. Kelsey and J. B.

Spooner. *Aeronautical Research Council, C. P. no. 353*, Dec. 1955, 48 p.

Bonded joints tended to fail by shear of the bond at the higher stress ranges and by tension of the sheet at the lower stress ranges. Riveted joints failed by tension across the first row of rivets in all cases, though tests on three-row riveted joints showed considerable improvement in endurance over those with two rows of rivets. Endurances were greater for bonded joints but with rather more scatter than for riveted joints.

(Q7d; Al-b, 4-53, 7-53, 7-58)

**769-Q. Size Effects in Slow Notch-Bend Tests of a Nickel-Molybdenum-Vanadium Steel.** J. D. Lubahn and S. Yukawa. *American Society for Testing Materials, Preprint*, no. 79, 1958, 16 p.

13 ref. (Q5h; AY, Ni, Mo, V)

**770-Q. A Mechanism for Nonpropagating Fatigue Cracks.** L. F. Coffin, Jr. *American Society for Testing Materials, Preprint*, no. 72, 1958, 6 p.

7 ref. (Q7f; ST)

**771-Q. Hysteresis and Anelasticity in Cold-Worked Stainless Steel.** J. D. Lubahn. *American Society for Testing Materials, Preprint*, no. 77, 1958, 11 p.

Creep and cyclic loading tests on cold stretched stainless steel show that the hysteresis in cyclic loading is not an anelasticity phenomenon. Practical significance of this hysteresis as a possible source of damping. 12 ref. (Q22, Q3; SS)

**772-Q. Preparation and High-Temperature Properties of Nickel-Al<sub>2</sub>O<sub>3</sub> Alloys.** Walter S. Cremens and Nicholas J. Grant. *American Society for Testing Materials, Preprint*, no. 83, 1958, 17 p.

Nickel-Al<sub>2</sub>O<sub>3</sub> alloys were tested in tension at room temperature and in creep rupture at  $1300$  to  $1800^{\circ}\text{F}$ . The interparticle spacing of the Al<sub>2</sub>O<sub>3</sub> in the alloy is related to the measured mechanical properties. 15 ref. (Q27a, Q3m; Ni, Al, 6-70)

**773-Q. Temperature and Time Stability of M257 and SAP Aluminum-Aluminum Oxide Alloys.** W. S. Cremens, E. A. Bryan and N. J. Grant. *American Society for Testing Materials, Preprint*, no. 84, 1958, 7 p.

The 6 to 8% Al<sub>2</sub>O<sub>3</sub> (M257) alloy and the 10 to 14% Al<sub>2</sub>O<sub>3</sub> (SAP) alloy in the system Al-Al<sub>2</sub>O<sub>3</sub> were cold worked up to 66 and 29%, respectively, after which they were annealed for various periods of time near the melting point. The effect of cold work, annealing time and temperature on the resultant tensile, yield and ductility values are reported; effect on the  $600^{\circ}\text{F}$ . stress-rupture properties.

(Q23, Q27, Q3m, 3-68, 2-64; Al, 6-70)

**774-Q. Low Temperature Effects on Metals.** J. Waring. *Australasian Engineer*, v. 50, Nov. 7, 1957, p. 73-79.

(Q-general, 2-63)

**775-Q. High Temperature Properties of 18-12-1 Cr-Ni-Nb Steel.** *British Electrical and Allied Industries Research Association, J/T169*, Oct. 11, 1956, 22 p.

For boilers. (Q-general, 2-62, T26q, 17-57; SS)

**776-Q.\* Plastic Flow and Fracture of a Brittle Material (Grey Cast Iron) With Particular Reference to the Effect of Fluid Pressure.** B. Crossland and W. H. Dearden. *Chartered Mechanical Engineer*, v. 5, Mar. 1958, p. 103-105.

Torsion tests on centrifugally cast

gray iron specimens protected with a rubber film were carried out at pressures up to 35 tons per sq. in., and for large strains the shear stress against over-all strain derived from these tests is shown. 7 ref. (Q26, Q24, Q1, 3-74; CI-n, 5-65)

**777-Q.\* The Latest Edgar Allen Special Alloy Tool Steels.** *Edgar Allen News*, v. 37, Mar. 1958, p. 56-57.

Description of A.M. 3 die steel, a Cr-Mo-V alloy, Lominium steel, a Mn-Cr-V alloy, A.M. 1 die steel, and Maxnap steel, designed for rivet snaps. (Q-general; TS)

**778-Q. Probability Theory of Fatigue.** A. Ferro and R. Colombo. *Engineers' Digest*, v. 18, Nov. 1957, p. 487-490. (From *Metallurgia Italiana*, no. 7, 1957, p. 518-522.)

Previously abstracted from original. See item 1053-Q, 1957. (Q7, S12)

**779-Q. Mixed-Blast Basic-Bessemer Steels.** A. Kruger and E. Schmidtmann. *Iron and Coal Trades Review*, v. 176, Mar. 7, 1958, p. 577-581. (From *Stahl und Eisen*, Dec. 26, 1957, p. 1868-1873.)

Previously abstracted from original. See item 246-Q, 1958. (Q-general; ST-g)

**780-Q. Determination of Residual Stresses in Titanium Carbide-Base Cermets by High-Temperature X-Ray Diffraction.** Herbert W. Newkirk, Jr., and Harry H. Sisler. *Journal of American Ceramic Society*, v. 41, Mar. 1958, p. 93-103.

Crystal structure and thermal expansion of titanium carbide, Ni, and two Ti carbide-base cermets between room temperature and 1100° C. 19 ref. (Q25h, M27, P11g; Ti, Ni, 6-70)

**781-Q.\* Experimental Study of Initial and Subsequent Yield Surfaces in Plasticity.** P. M. Naghdi, F. Esenburt and W. Koff. *Journal of Applied Mechanics*, v. 25, June 1958, p. 201-209.

Experimental results for 25 tubular specimens of a 24S-T4 Al alloy, subjected to combined torsion-tension and reversed torsion, are reported in a study of the initial and two subsequent yield surfaces covering the first and the fourth quadrant of the axial stress-shear stress plane. 14 ref. (Q21d, Q1; Al-b, 4-60)

**782-Q.\* Strain-Aging, Work-Hardening, and Inhomogeneous Deformation in Armo Iron After Static and Dynamic Deformation.** H. P. Tardif and W. Erickson. *Journal of Applied Mechanics*, v. 25, June 1958, p. 285-287.

Under compression impact the work hardening produced is less than that produced by the same amount of statically applied strain. Hardness is not uniform throughout the length of the specimens. (Q24, Q23a, N7e; Fe-a)

**783-Q. Tightening and Tensile Tests on Joints Assembled With Bolts Threaded BSW, BSF, UNC and UNF.** J. E. Field. *Machinery (London)*, v. 92, June 1958, p. 1381-1394, 1425.

Unified Fine Threads, British Standard Fine Threads, Unified Coarse and British Standard Whitworth Threads. (Q27, T7f; 7-54)

**784-Q.\* Creep of Annealed Nickel, Copper, and Two Nickel-Copper Alloys.** William D. Jenkins and Carl R. Johnson. *National Bureau of Standards, Journal of Research*, v. 60, Mar. 1958, p. 173-191.

Creep tests were made in tension under constant loads at temperatures of 300 to 900° F. on initially

annealed specimens of Ni, Cu, 70-30 Ni-Cu alloy and 30-70 Ni-Cu. Tests at 1200° F. were also made on the Ni and the two alloys. Influence of rate of loading on the creep stress and of prior thermal mechanical history on the creep behavior of the alloys at several selected temperatures. 25 ref. (Q3, 2-64; Ni, Cu)

**785-Q.\* Preliminary Studies of Rolling-Contact Fatigue Life of High-Temperature Bearing Materials.** Thomas L. Carter. *National Advisory Committee for Aeronautics, NACA RM E57K12*, Apr. 1958, 27 p.

Investigation was made in the rolling contact fatigue spin rig. Vacuum melting improved fatigue life for AISI M-1 toolsteel, for both balls and races; further Al and Si additions, with or without Mo, to the basic SAE 52100 composition improved fatigue life with no apparent change in cleanliness. No correlation of rolling-contact fatigue life with cleanliness was obtained. 6 ref. (Q7a; AY, SGA-c)

**786-Q.\* Unloading Effects in the Plastic Properties of Copper Single Crystals.** M. J. Makin. *Philosophical Magazine*, v. 3, Mar. 1958, p. 287-301.

Yield point phenomena occur on retesting Cu single crystals during interrupted tensile deformation. The effect is observed only during the linear and parabolic regions of the stress-strain curve and the size of the yield drop is directly proportional to the reduction in the stress on unloading. 9 ref. (Q24c; Cu, 14-61)

**787-Q.\* The Temperature Dependence of Flow Stress in Copper Single Crystals.** M. J. Makin. *Philosophical Magazine*, v. 3, Mar. 1958, p. 309-311.

Crystals were tested in a hard beam tensile machine at a strain rate of  $6 \times 10^{-5}$  per sec. Measurements were made between -195 and -159° C., -115, -78, -51, -30 + 84 and +196° C. Results confirm that the ratio of the flow stresses at two temperatures settles down after about 10% elongation to a constant value. (Q24, Q25n; Cu, 14-61)

**788-Q. Primary Creep in Aircraft Design.** B. B. Muvdi and C. J. Gienza. *Society of Automotive Engineers, Preprint*, v. 46A, Apr. 1958, 16 p.

19 ref. (Q3, T24, 17-51; SS, Al-b, Ti-b)

**789-Q.\* Problems Relating to the Need for Heat Tolerant Materials in Aerodynamic Applications.** P. W. Rowe. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 4-20.

Principal problems facing the airframe designer are high-temperature elongation, reduction of strength, reduction of the modulus of elasticity, creep, corrosion, erosion and melting. 15 ref. (Q-general, 2-62, R-general, T24a; SGA-h)

**790-Q.\* Metals for Structures Exposed to Aerodynamic Heating.** Wolfgang H. Steurer. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 21-47.

Age hardening, transformation heat treatment, cold working and other strengthening treatments for short-time, high-temperature exposure. 16 ref. (Q27a, 2-62, J-general, Q23a, T24)

**791-Q.\* Materials Property Requirements and Test Methods for Aerodynamic Applications.** Louis Luini. Paper from "Metals for Super-

sonic Aircraft and Missiles", American Society for Metals, p. 48-95.

High-temperature tensile, creep, rupture, relaxation fatigue, oxidation, abrasion and erosion tests. New types of creep resistant alloys consist mainly of a base containing a combination of Ni, Cr, Fe and Co, to which various strengthening elements such as C, Mo, W, Ti and Ta are added. 18 ref. (Q-general, 2-62, 1-54, T24; SGA-h)

**792-Q.\* The Light Metals—Aluminum, Magnesium, Titanium.** R. R. Kennedy. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 202-216.

Extensive review of high-temperature properties in connection with aircraft applications. Field of usefulness of the light metals is in the moderate temperature range. 6 ref. (Q-general, 2-62, T24; Al, Mg, Ti)

**793-Q.\* Nickel and Cobalt Base Alloys.** F. S. Badger and G. A. Fritzlen. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 234-260.

Physical, mechanical and thermal properties with particular reference to Hastelloy C, Hastelloy R-235, Hastelloy X, Inconel, Inconel X, Nimonic 75, Nimonic 80A, Haynes no. 25, Haynes Multimet, J-1570. 24 ref. (Q-general, P-general, 2-62; Ni-b, Co-b)

**794-Q.\* The Properties of Eleven Less Common Metals.** B. A. Rogers. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 261-314.

Mechanical and physical properties of chromium, columbium, hafnium, iridium, molybdenum, osmium, rhenium, tantalum, tungsten, vanadium and zirconium in connection with aircraft applications. Fabrication problems. 128 ref. (Q-general, P-general, T24; Cr, Cb, Hf, Ir, Mo, Os, Re, Ta, W, V, Zr)

**795-Q.\* Fundamentals of Metal-Ceramic Combinations (Cermets).** Henry H. Hausner. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 315-339.

High melting temperatures of the oxides, carbides and borides of Ti, Zr, V, Nb, Ta, Cr, Mo, W, Th, and their high strength at elevated temperatures permit application of cermets for high-temperature purposes and as aircraft construction. 19 ref. (Q-general, 2-62, T24, 17-57; SGA-h, 6-70)

**796-Q.\* Specific Ceramics and Cermets of Promise.** Malcolm F. Judkins. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 340-352.

Refractory materials for use at high temperatures must retain strength and structural integrity at service temperatures; resist erosion and corrosion; resist thermal and mechanical shock at all temperatures; be light weight for aircraft rocket and nozzle applications. Available data on oxides, carbides, borides, nitrides, silicides, titanides, cermets and intermetallic compounds. 21 ref. (Q-general, H-general, 2-62; SGA-h, 6-70)

**797-Q.\* Review, Summary and Evaluation.** J. R. Townsend. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 353-362.

Critical summation of each of the 11 papers together with a correlation of the main points.

(Q-general, 2-62; T24, 17-57; SGA-h)

**798-Q.\*** Performance of Materials at Elevated Temperatures for Aircraft and Missile Applications. Alan V. Levy. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 369-399.

Short-time tensile, creep, stress-rupture and physical properties of Al, Mg, Ti and Mo alloys, stainless steel, high-temperature alloys, age hardenable stainless steels and alloy steels presented in tabular form. Several promising new alloys discussed. 16 ref.

(Q27a, Q3m, P-general; SGA-h)

**799-Q.** Comparison of the Abrasive Properties of Grains of Minerals by the Method of Mutual Grinding. V. N. Kashcheev. *Soviet Physics, Technical Physics*, v. 2, 1957, p. 1001-1008. (Translation by American Institute of Physics, Inc.)

The ratio of the losses of weight or of volume of two materials ground against each other depends on the abrasive used. This dependence is the stronger, the larger the differences of the mechanical properties of the two materials undergoing mutual grinding. 9 ref.

(Q9, 1-54)

**800-Q.** Laws Governing Lubrication When Metals Are Worked Under Pressure. S. Ia. Veiler and V. I. Likhtman. *Soviet Physics, Technical Physics*, v. 2, 1957, p. 989-995. (Translation by American Institute of Physics, Inc.)

Study of metal flow and elastic rebound effect in the presence of lubricants in the processes of wire-drawing and shell drawing. 9 ref.

(Q24, F28, G4, 18-73)

**801-Q.** Testing the Scratch Resistance of Metals. M. M. Tenenbaum. *Soviet Physics, Technical Physics*, v. 2, 1957, p. 1006-1015. (Translation by American Institute of Physics, Inc.)

Investigation into the scratch method using a trihedral diamond point for testing the mechanical properties of metals and alloys, as distinct from the properties determined by microhardness. 18 ref.

(Q29d)

**802-Q.** (English.) Fatigue Tests on Basic Bessemer and Openhearth Steels. Alfred Funck. *Acier-Stahl-Steel*, Jan. 1958, p. 19-24.

9 ref. (Q7a; ST-e, ST-g)

**803-Q.\*** (English.) On the Fracture of Aluminum Polycrystals. Minoru Okada and Hiroshi Fujita. *Osaka University, Technology Reports*, v. 6, Oct. 1956, p. 329-344.

Nature of fracture studied in terms of the stress rate (loading speed). With an increase in loading speed the spacing of slip bands and the number of fine structures in each slip band are decreased, but the elastic limit, the rate of strain hardening, the heterogeneity of deformation in short range, the interaction of adjacent grains, the rate of fragmentation, the necking stress and the homogeneity of deformation all over the specimen are increased respectively. 8 ref.

(Q26, Q24; Al)

**804-Q.** (English.) Fatigue of Metals. Pt. 2. C. E. Phillips. *Teknisk Ukeblad*, v. 105, Feb. 20, 1958, p. 169-175.

Influence of notches and stress gradients; theories of failure; design considerations. (Q7)

**805-Q.** (German.) Determination of Notch Bar Toughness. Vladimir Ko-

marek. *Acta Technica*, no. 1, 1958, p. 26-56.

4 ref. (Q27d)

**806-Q.** (German.) Influence of Various Alloying Additions on the Elastic Properties of Copper Alloys. *Draht Fachzeitschrift*, v. 9, Mar. 1958, p. 90-91.

(Q21, 2-60; Cu-b, AD-n)

**807-Q.** (German.) Radioactive Measurement of Wear During Machining. O. Hake. *Industrie-Anzeiger*, v. 80, Apr. 4, 1958, p. 15-24.

(Q9, 1-60, G17)

**808-Q.** (German.) Structure and Mechanical Properties of Copper-Chromium and Copper-Zinc-Chromium Alloys. Nurettin Cuhadar. *Istanbul Teknik Universitesi Bulteni*, v. 10, no. 3, 1957, p. 3-30.

6 ref. (Q-general, M27; Cu-b, Cr-b, Zn-b)

**809-Q.** (German.) Damping of Metals. R. Fichter. *Schweizer Archiv*, Mar. 1958, p. 65-78.

26 ref. (Q8)

**810-Q.** (German.) Light Alloys. Paul Kreckel. *VDI Zeitschrift*, v. 100, Apr. 11, 1958, p. 463-464.

Aluminum forgeable alloys and casting alloys. (Q-general; Al-b)

**811-Q.** (Japanese.) Change of Rigidity of Pure Silver Wire by Cold Work and Subsequent Annealing. Jun Kuroyanagi. *Japan Journal of Applied Physics*, v. 27, Apr. 1958, p. 201-211.

32 ref. (Q23p, 2-64, 3-68; Ag, 4-61)

**812-Q.\*** (Rumanian.) Contribution to Study of the Hardening of Aluminum by Small Percentages of Alloying Elements. Marius Protopopescu. *Studii si Cercetari de Metalurgie*, v. 2, no. 4, 1957, p. 425-446.

The effect of small amounts of Zn, Mg, Cu and Mn on the electrical resistivity and Brinell hardness of commercial Al of 99.75% purity. Electrical resistivity increases almost linearly after which the variation is parabolic. Simultaneous large electrical conductivity with optimum mechanical properties can be obtained by suitably varying the aging temperature of the quenched specimen and the cross-section reduction in wire-drawing immediately after quenching. 11 ref. (Q29n, P15g, 2-60; Al-a, Cu, Mg, Mn, Zn)

**813-Q.** (Russian.) Abrasive Wear of Steels in Reciprocating-Rotary Motion. R. M. Matveyevskii. *Vestnik Mashinostroenia*, May 1958, p. 31-35.

(Q9; ST)

**814-Q.** (Russian.) Increasing the Fatigue Strength of Large Machine Parts. I. G. Sokolov. *Vestnik Mashinostroenia*, May 1958, p. 47-50.

Results of various methods of heat treatment on the fatigue strength of forged steel machine parts. (Q7a, 2-64; ST, 4-51)

**815-Q.** (Book.) Metals for Supersonic Aircraft and Missiles. 432 p. 1958. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. \$7.50.

Proceedings of the Conference on Heat Tolerant Metals for Aerodynamic Applications held Jan. 28 and 29, 1957, at the University of New Mexico, Albuquerque. Papers abstracted separately.

(Q-general, 2-62; T24, 17-57; SGA-h)

**816-Q.** (Book.) Metals. 175 p. 1956. American Society for Testing Materials, STP no. 196, 1916 Race St., Philadelphia 3, Pa. \$4.50.

Eleven papers, with discussions, presented at 2nd Pacific Area National Meeting ASTM, Los Angeles, Sept. 17-21, 1956. Papers, mainly

concerned with fatigue, abstracted separately. (Q7)

**817-Q.** (Book.) Elevated-Temperature Properties of Wrought Medium-Carbon Alloy Steels. 128 p., Jan. 1957. American Society for Testing Materials, STP no. 199, 1916 Race St., Philadelphia 3, Pa. \$4.25.

(Q-general, 2-62; AY)

**818-Q.** (Book.) Fatigue of Aircraft Structures. 100 p. 1956. American Society for Testing Materials, STP no. 203, 1916 Race St., Philadelphia 3, Pa. \$2.75.

Six papers presented at Second Pacific Area National Meeting of the ASTM, Los Angeles, Sept. 16-21, 1956. Papers abstracted separately. (Q7, T24)

**819-Q.** (Book.) Symposium on Titanium. 208 p. 1958. American Society for Testing Materials, STP no. 204, 1916 Race St., Philadelphia 3, Pa. \$4.75.

Fourteen papers from Second Pacific Area National Meeting ASTM, Los Angeles, Sept. 1956, on testing techniques and effects of various heat treatments on the properties and characteristics of Ti and Ti alloys. Papers abstracted separately. (Q-general; Ti)

**820-Q.** (Book.) Symposium on Large Fatigue Testing Machines and Their Results. 151 p. 1958. American Society for Testing Materials, STP no. 216, 1916 Race St., Philadelphia 3, Pa. \$4.25.

Papers abstracted separately. (Q7, 1-53)

**821-Q.** (Book.) Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals. Syracuse University Research Institute. 2 v., 399 p., Mar. 1956. U. S. Office of Technical Services, PB 131280, PB 131281, Washington 25, D. C. \$10.50.

Twenty papers presented at Army Ordnance Corps. Research Conference held at Sagamore Lake, N. Y., Aug. 24-26, 1955. Papers abstracted separately. (Q27)

**822-Q.\*** (German.) Determination of Radiographic Value of Elastic Constant on Cold Rolled Armo Iron and Chromium-Molybdenum Steel. Eckard Macherauch and Paul Müller. *Archiv für das Eisenhüttenwesen*, v. 29, Apr. 1958, p. 257-260.

Possible ways to determine elastic constant on the basis of elasticity theory. Two precise methods using radiographic measurements of lattice dimension. Tension experiments on Armo iron. Tension-pressure experiments on a Cr-Mo steel. (Q21, 1-54; Fe-a, AY, Cr, Mo)

**R**  
Corrosion

**374-R.** Corrosion—What Causes It and How It Happens. Pt. 3. W. A. Koehler. *American Gas Journal*, v. 185, May 1958, p. 39-41.

(R-general)

**375-R.\*** Nitric-Hydrofluoric Acid Evaluation Test for Type 316L Stainless Steel. Donald Warren. *ASTM Bulletin*, no. 230, May 1958, p. 45-56.

A 10% nitric, 3% hydrofluoric acid test for intergranular corrosion

- resistance of Type 316L stainless steel. Test is sensitive to damaging carbide precipitation in the grain boundaries of the steel but is insensitive to the presence of sigma phase. 17 ref. (R2h, R11; SS)
- 376-R.** Corrosion Properties of Tantalum. Clifford A. Hampel. *Corrosionomics*, v. 3, no. 2, 1958. (R1; Ta)
- 377-R.\*** Vapor-Phase Corrosion Inhibitors. S. Rowden. *Corrosion Technology*, v. 5, Apr. 1958, p. 117-121, 126. Reviews principal classes of volatile corrosion inhibitors; their chemical composition, possible mode of action, effects of environmental temperature, pH, water and vapor pressure of inhibitor and effectiveness of protection for various metals. 13 ref. (R10b; Cu, Cl, Mg, ST, Zn)
- 378-R.** The Protection of Motor Vehicles From Corrosion. *Corrosion Technology*, v. 5, Apr. 1958, p. 129-130. Abstracts of five papers from symposium at Institute of Mechanical Engineers including experience with Al alloys, sodium benzoate and sodium nitrite inhibitors in engine coolants. Inhibitors for ethylene glycol water coolants and materials for minimizing exhaust system corrosion. (R10b, T21; Al, Cu, Ni, ST)
- 379-R.\*** Corrosion of Some Metals and Alloys in Uranium Hexafluoride. D. Heymann and F. E. T. Kelling. *Corrosion Technology*, v. 5, May 1958, p. 148-151, 158. Corrosion rate for carbon, low-alloy and stainless steels, Al, Cu and Ni alloys exposed to uranium hexafluoride at 80° C. for periods up to two months. Ni, Monel, Cu, Al and stainless steel have excellent corrosion resistance. Ti and ordinary steels show good resistance. (R6p; AY, CN, SS, Al, Cu, Ni, Ti)
- 380-R.** Electrochemical Behavior of Zinc in Alkaline Solutions. Pt. 1. Constant Current Measurements. Indra Sanghi and W. F. K. Wynne-Jones. *Indian Academy of Sciences, Proceedings*, v. 47A, Feb. 1958, p. 49-64. 30 ref. (R1a, T1; Zn)
- 381-R.\*** Corrosion-Rate Data Can Be Exact. *Marine Engineering Log*, v. 63, May 1958, p. 57-61. Corrosion data for tanks and tankers by means of thickness measurements utilizing Mylar film, ultrasonics, gamma radiography and electrical resistance. (R11a, S14, T22)
- 382-R.\*** Corrosion of Zinc Plated Steel. Russell H. Wolff. *Metal Finishing*, v. 56, June 1958, p. 46-52. Corrosion observed in exposure to 20% salt spray fog (ASTM B117-49T) and outdoors. Test panels were prepared with and without a supplementary chromate dip. Weight changes observed periodically. 6 ref. (R11j, R3; ST, 8-12, Zn)
- 383-R.** Corrosion of Mild Steel in Some New Zealand Soils. H. R. Penhale. *New Zealand Journal of Science*, v. 1, Mar. 1958, p. 52-69. 8 ref. (R8; CN)
- 384-R.** (Czech.) Corrosion of Steel Protected With Oil Films by Water Vapor. Robert Bartoniak. *Chemické Listy*, no. 52, 1958, p. 190-195. 10 ref. (R4, R10f; ST)
- 385-R.** (Czech.) Corrosion of Aluminum by Hydrogen Sulphide. Karel Smrček, Ivan Sekerka and Vladimír Seifert. *Chemické Listy*, no. 52, 1958, p. 196-200. 8 ref. (R6g; Al-b)
- 386-R.** (French.) Role and Future of Sintered Products. Pt. 2. Sintered Products and Corrosion: Cermets. R. Meyer. *Nature*, no. 3276, Apr. 1958, p. 134-138. (R-general; 6-69, 6-70, 6-72)
- 387-R.\*** (German.) Influence of Coatings on Stress-Corrosion Cracking of Steel. Hubert Gräfen. *Archiv für das Eisenhüttenwesen*, v. 20, Apr. 1958, p. 225-229. Effect of coatings on intercrystalline corrosion of unalloyed and alloyed steels in nitrate solutions with addition of halogenides or chromates. Role of oxygen. Transcrystalline stress-corrosion of austenitic steels in chloride solutions with and without addition of oxygen. (R1d; ST, 8)
- 388-R.\*** (Hungarian.) Changes of Structure and Manufacturing Defects Caused by Scaling, in Hot Rolled Bronze. Z. Hegedus. *Acta Technica*, v. 19, no. 3-4, 1958, p. 363-369. Surface cracks formed at the first passes of hot rolling are connected with de-tinning of the surface and formation of  $\text{SnO}_2$  in the atmosphere of the oxidizing furnace. Formation of scale proceeds in two steps. First, the Sn content of the alpha-crystal oxidizes into  $\text{SnO}_2$  and only after complete detinning, the Cu oxidizes. Thickness of the detinned layer is a function of the homogenization temperature and the time. 5 ref. (R2q, F23, 1-66; Cu-s)
- 389-R.\*** (Japanese.) Sulphur Corrosion of Cast Iron. Yo. Serita. *Japan Foundrymen's Society, Journal*, v. 30, Feb. 1958, p. 88-95. Specimens of pure iron, Fe-C alloy and Fe-C with a third element (Cr, Mn, Al or V) were heated with pure sulphur in a silica tube. Ferrite was corroded easily but cementite had good resistance. Specimens with added third element showed good resistance to corrosion except for Mn. (R6q, Fe, Cl, S)
- 390-R.** New Clue to Corrosion. *Chemical and Engineering News*, v. 36, June 16, 1958, p. 48. (R11, W13b; SS)
- 391-R.\*** Corrosion of Metals in Ethylene Glycol Solutions. R. J. Agnew, J. K. Truitt and W. D. Robertson. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 649-656. Corrosion of hot rolled steel, cold rolled Cu and brass, Al and cast Fe under various pH and temperature conditions. 12 ref. (R7f; ST, Cu, Al, Cl)
- 392-R.\*** The Corrosion of  $2\frac{1}{2}\%$  Cr-1 Mo Steel by Liquid Bismuth. G. W. Horsley and J. T. Maskrey. *Iron and Steel Institute, Journal*, v. 189, June 1958, p. 139-148. Dynamic corrosion of superheater tubing by liquid bismuth studied in thermal convection loops working with maximum temperatures up to 625° C., temperature gradients up to 150° C., and fluid velocities of 3-4 mm. per sec. Effect of adding 250-500 ppm. Zr to the Bi as an inhibitor. 8 ref. (R6m; AY, Bi)
- 393-R.\*** Formation of the Delta-Phase by Oxidation of Alpha-Titanium. I. Koncz and M. Koncz-Deri. *Periodica Polytechnica*, v. 1, no. 1, 1957, p. 67-87. Oxidation of iodide titanium studied in a range of 570 to 820° C., and a pressure of 2 to 5 mm. Hg in pure oxygen, for periods up to 210 min. Dense, adherent oxide layers show rectifying properties; the presence of delta-phase Ti in these layers verified by X-ray analysis. Diffusion coefficient of oxygen in alpha Ti determined. Possible explanation for mechanism of the oxidation process. 12 ref. (R1h, N1b; Ti)
- 394-R.** Effects of Carbon Content on the Rate of Dissolution of Dingt Uranium in Nitric Acid. A. L. Bement and J. L. Swanson. Hanford Atomic Products Operation. U. S. Atomic Energy Commission, HW-52430, Nov. 11, 1957, 20 p. (Order from Office of Technical Services, Washington 25, D. C.) \$.75. Carbon additions made to dingt uranium by vacuum casting with a high-frequency electronic heater varied from 150 to 1500 ppm. The specimens were beta heat treated, then dissolved in nitric acid. Dissolution rates were determined for the linear, initial portion of the weight-loss-versus-time curves. The rates so obtained were compared with those for samples of ingot, and normal and high-carbon dingt uranium. The effect of grain size on the dissolution rate can be expressed as a power function. (R6g, 2-60; U)
- 395-R.\*** Pit Depth Measurements as a Means of Evaluating the Corrosion Resistance of Aluminum in Sea Water. T. J. Summerson, M. J. Pryor, D. S. Keir and R. J. Hogan. Paper from "Metals", ASTM STP No. 196, p. 157-175. Quantitative method based on a statistical treatment of penetrometer measurements of every pit present on test specimens immersed in sea water for periods up to 24 months. Normal frequency distributions were obtained by plotting the frequency of pitting against the square root of the pit depth. Calculations of the mean square root pit depth, the standard deviation and standard error of the mean square root pit depth are shown. 10 ref. (R11, R4b, S12; Al)
- 396-R.** Corrosion of Uranium, Thorium, and Uranium Alloys in Sodium and Organics. Harry Pearlman. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 565-587. Corrosion rate of uranium and its alloys depends strongly on the impurity and content (especially oxygen) of the liquid metal. In capsule-type static corrosion experiments, made with liquid metal with oxygen content near 0.01% (100 ppm.), corrosion rates are of the order of 10 mg. per sq. cm. per month at temperatures up to 750° C.  $\text{UO}_2$  and  $\text{UO}$  have been identified as corrosion products. 30 ref. (R6m, R7; U, Th)
- 397-R.\*** (French.) Chromium-Aluminum Steels, Their Properties and Applications. E. Herzog. *Corrosion et Anticorrosion*, v. 6, Apr. 1958, p. 117-126. Principal characteristics of Cr-Al steels. Resistance to fissuring in solutions of nitrates and in hydrogen sulphide. Surface condition and corrosion rate; transformations and mechanical properties; results of corrosion tests. (R-general; AY, Cr, Al)
- 398-R.\*** (French.) Study of the Internal Corrosion of Pipes in the Transport and Distribution of Purified City Gas Under Various Pressures. J. Morlet. *Corrosion et Anticorrosion*, v. 6, Apr. 1958, p. 127-131. Extent to which the corrosive action of purified city gas on soft steel pipe, in the absence or presence

of condensed water, depends on its oxygen and carbon dioxide content and on pressure. Corrosion was found to be independent of pressure and of CO<sub>2</sub> content. Possibility of considerably decreasing the corrosive action of purified city gas by limiting its oxygen content or by dehydrating it, the latter being the more effective procedure. (R7g; CN, 4-60)

**399-R.\*** (French.) **Stress-Corrosion of Aluminum Alloys.** F. A. Champion. *Corrosion et Anticorrosion*, v. 6, Apr. 1958, p. 132-140. 21 ref. (R1d, Al-b)

**400-R.** (French.) **Corrosion Control in Industry.** J. Strebelle and M. Stassin. *Métaux Corrosion-Industries*, no. 391, Mar. 1958, p. 115-124.

Problems of corrosion classified according to their characteristics and the protective means most frequently applied. Illustrations of typical corrosion in industrial machinery. (R-general, R10)

**401-R.\*** (French.) **Rapid Detection and Location of Corrosibility in Protective Coatings on Metal.** G. Blet. *Peintures, Pigments, Vernis*, v. 34, Apr. 1958, p. 160-163.

Tests of a nonconductor coating on iron base, completed in 2 hr. by use of porosimeter, confirmed by salt spray tests requiring three weeks and costly equipment. Porosimeter is useful for rapid check of corrosion potential, but will not reveal existence of blind pores beneath surface of coating which can become source of rapid corrosion if even slight abrasion occurs. (R11, 1-53; Fe, 8-70)

**402-R.\*** (Japanese.) **Effect of Manganese and Chromium on the Characteristics of Aluminum-Magnesium (3-5%) Wrought Alloys.** Pt. 2. Rihei Kawachi. *Light Metals (Tokyo)*, v. 8, Mar. 1958, p. 14-23.

To confirm the effect of Mn on the Al-Mg alloy as well as the effect of Fe, Si, Cu and Ti on an alloy of 4.4-5% Mg, 0.5% Mn, and 0.2% Cr, with respect to corrosion resistivity and changes of tensile strength, samples were immersed in sea water for up to 12 months. Al-Mg binary alloys are best; addition of Mn, Cr, Fe or Cu decreases corrosion resistance; effects of Si, Zn and Ti are small. (R4b, 2-60; Al, Mg, Mn)

**403-R.** (Russian.) **Determination of Thickness of Moisture Film on Metals During Atmospheric Corrosion.** N. D. Tomashov and A. A. Lokotilov. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 425-427.

Electrochemical procedure employing specially designed adsorption apparatus for enlarging area of tested specimen. 11 ref. (R3, R11m)

**404-R.** (Russian.) **Device for Measurement of Corrosion Effect of Lubricants at Moderate Temperatures.** G. I. Fuks and L. V. Timofeeva. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 427-429. (R7e, R11, 1-53; NM-h)

**405-R.** **Thermogalvanic Corrosion.** V. V. Gerasimov and I. L. Rozenfeld. *Academy of Sciences, Bulletin*, no. 1, 1957, p. 29-31. (Translation by Consultants Bureau, Inc.)

Thermogalvanic corrosion depends on the potential difference between the cold and hot electrodes, the electrical conductivity of the solution, the distance between the electrodes and the overvoltages of the anode and cathode processes. Thermogalvanic corrosion of Fe, Cu, Ni and Pb in neutral, alkaline and acid

solutions investigated for different temperature differences and relative electrode areas and with and without stirring of the electrolyte. 4 ref. (R1a; Fe, Ni, Cu, Pb)

**406-R.\*** **Quantitative High-Temperature Oxidation of Porcelain Enamels.** H. G. Lefort and A. L. Friedberg. *American Ceramic Society, Journal*, v. 41, June 1, 1958, p. 216-226.

Oxidation studied as a function of time and temperature on both bare and enameled iron. Specimens were subjected to variations in enamel thickness, thickness of electroplated nickel deposit, and surface preparation of the iron. The rate of oxidation of enameled iron was lower than that of bare specimens at all temperatures. (R1h, 2-62; Fe, 8-71)

**407-R.** **Irradiation as a Corrosion Accelerator.** *Australasian Manufacturer*, v. 43, May 10, 1958, p. 52, 54-58.

Nuclear reactor behavior of Be, stainless steel, Al, Mg and Zr. (R-general, 2-67, T11; Be, SS, Al, Mg, Zr)

**408-R.** **The Corrosion Resistance of Titanium.** J. B. Cotton and H. Bradley. *Chemistry and Industry*, May 31, 1958, p. 640-646. (R-general; Ti)

**409-R.\*** **Note on the Characteristics of Potential Time Curves for Painted Non-Ferrous Metals.** J. H. Greenblatt. *Journal of Applied Chemistry*, v. 8, Apr. 1958, p. 229-232.

Potentials of steel, Al, brass and Cu rods overcoated with various paints were measured in seawater over a period of time. Potentials obtained in all cases were determined by the substrate metal rather than the paint coating used. The potential-time curves on Cu, brass and Al have the same characteristics as those on steel. 5 ref. (R11m, R4b; Cu, Al, ST)

**410-R.\*** **Corrosion of Steel in Moist Air.** J. T. Crennell. *Journal of Applied Chemistry*, v. 8, Apr. 1958, p. 270-272.

Specimens of steel stored at room temperature and approximately 100% relative humidity for periods up to seven years have shown a remarkable absence of corrosion. (R4, ST)

**411-R.** **What Socony Mobil Learned About Corrosion in Cat Reformers With Naphtha Pretreaters.** E. B. Backensto and R. W. Manuel. *Oil and Gas Journal*, v. 56, May 19, 1958, p. 131-135. 7 ref. (R7a)

**412-R.** **Corrosion of Reinforcing Steel in Concrete in Marine Atmospheres.** D. A. Lewis and W. J. Copenhagen. *South African Industrial Chemist*, v. 11, Oct. 1957, p. 207-219.

Concrete, in which steel is normally passive, when penetrated by salt water and air allows micro and macro corrosion to proceed. Externally applied coating can reduce corrosion significantly. 19 ref. (R4b; ST)

**413-R.** **The Effect of Temperature and Oxygen Content of Sea Water on the Corrosion of Welded Seams of Ice Breakers.** Eino Uusitalo. *Suomen Kemistilehti*, v. 31, no. 3, 1958, p. 170-174. (R4b, T22g; 7-51)

**414-R.\*** **Corrosion and Ignition of Titanium in Fuming Nitric Acid.** John B. Rittenhouse. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 145-160.

Corrosion of Ti and its commercial alloys at 25, 54 and 71° C. Corrosion rates increase with increas-

ing nitrogen dioxide in the range 0 to 20% and decrease with increasing water in the range 0 to 2%. Ignition or pyrophoric reactions can be initiated by impact or friction after exposure to fuming nitric acid containing from 0 to 1.25% water and from 2.5 to 28% nitrogen dioxide for periods exceeding 4 hr. (R6g; Ti)

**415-R.** (English.) **Investigation on the Oxidation Mechanism of Titanium.** P. Kofstad, K. Haufler and H. K. Jollesdal. *Acta Chemica Scandinavica*, v. 12, no. 2, 1958, p. 239-266. 38 ref. (R1h, 2-61; Ti)

**416-R.\*** (Russian.) **Investigation of High-Temperature Oxidation of Some Iron-Tungsten Alloys.** Yu. D. Kozmanov. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 74-81.

Alloys investigated contained up to 60% W. The alloy up to 16% W has greater resistance to heat than pure iron; alloying with W strongly increases heat resistance in the 700-800° C. region, but at 1100° C. the oxidation of the alloy differs little from that of iron. At high temperatures there is an important interaction between iron and tungsten oxides. 10 ref. (R1h, Fe, W)

**417-R.** **Corrosion in Catalytic Reforming and Associated Processes.** E. B. Backensto. *American Petroleum Institute, Proceedings*, v. 37, 1957, p. 87-92.

Summary report of the panel on reformer corrosion to the Subcommittee on Corrosion, Committee on Refinery Equipment. 17 ref. (R-general, T28n)

**418-R.** **Hydrogen Attack of Steel in Reformer Service.** A. R. Cluffreda and Warren D. Rowland. *American Petroleum Institute, Proceedings*, v. 37, 1957, p. 116-128.

Case history in which three internally insulated carbon-steel catalytic reactors suffered permanent damage by hydrogen over one year. Attack varied in severity and location, depending upon metal temperature. 5 ref. (R6g, T28; ST, H)

**419-R.** **Corrosion in Crude-Oil Processing—Low pH Versus High pH.** J. A. Biehl and E. A. Schnake. *American Petroleum Institute, Proceedings*, v. 37, 1957, p. 129-134. 7 ref. (R7a, T28n)

**420-R.** **Influence of Bicarbonate Ion on Inhibition of Corrosion by Sodium Silicate in a Zinc-Iron System.** Henry L. Shuldener and Leo Lehman. *American Water Works Association Journal*, v. 49, Nov. 1957, p. 1432-1440. 21 ref. (R10b; Zn, Fe)

**421-R.** **Right Material Cuts Pump Corrosion.** F. R. Drahos. *Chemical Engineering*, v. 65, Mar. 10, 1958, p. 162-166. (R-general, W13d; SGA-g)

**422-R.** **Underground Corrosion and Cathodic Protection of Gas Pipelines.** J. S. Gerrard. *Gas Journal*, v. 293, Mar. 5, 1958, p. 503-506. Nature of the attack; methods of corrosion reduction; magnesium anodes and impressed current systems. (R10d, T26r)

**423-R.** **Oxidation of Metals.** *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 496-502. Literature review for the past year. (R1h)

**424-R.\*** **Current and Potential Relations for the Cathodic Protection of Steel in Salt Water.** W. J. Schwerdtfeger. *National Bureau of Standards, Journal of Research*, v. 60, Mar. 1958, p. 153-159.

Laboratory investigation on cathodic protection of steel specimens exposed for 60 days to both stagnant and aerated city water, to which was added 3% NaCl. Significance of potential as a criterion for protection. Optimum protection was achieved when specimens were controlled at  $-0.77$  volt with reference to the saturated calomel half cell. 8 ref. (R10b; ST)

**425-R.** Mass Transfer in Liquid Metal Systems. Pt. 2. Isothermal Transfer. J. W. Taylor and A. G. Ward. *Nuclear Power*, v. 3, Mar. 1958, p. 101-105. 12 ref. (R2a; 14-60)

**426-R.** Cathodic Protection May Boost Corrosion. C. Breckon. *Petroleum Refiner*, v. 37, Mar. 1958, p. 189-190.

In the case of nonferrous alloys, service results show cathodic protection could be harmful to exchanger tubes. Superior results are achieved when Zn or Mg anodes are replaced by Fe anodes. (R10d, T28n)

**427-R.** Design to Cut Cathodic Protection Costs. O. W. Everett. *Pipe Line Industry*, v. 8, Mar. 1958, p. 40-43.

Pipe line installation and corrosion protection. (R10b; ST, 4-60)

**428-R.** Products Pipe Line Failure Under Cathodic Protection. Walter H. Bruckner. *Pipe Line News*, v. 30, Mar. 1958, p. 45-47. (R10d; T26r)

**429-R.** Influence of Some Organo-Element Compounds on the Solution Rate of Carbon Steel in Inorganic Acids. S. A. Balezin and M. A. Ignatyeva. *Academy of Sciences of the USSR. Proceedings*, v. 109, July-Aug. 1956, p. 459-461. (Translation by Consultants Bureau, Inc.) 5 ref. (R10b, R6g; CN)

**430-R.\*** Kinetics of Oxidation in a Gas Stream. J. T. Waber. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 96-169.

Analyses of processes such as ionic diffusion which occur in oxide films during high-temperature oxidation. Interrelationship between lattice defects, ionic conduction and oxidation. Behavior of various metals. 69 ref. (R1h, Ni)

**431-R.** (English.) The Sulphiding of Mild Steel Surfaces. M. R. Piggott and H. Wilman. *Acta Crystallographica*, v. 11, Feb. 10, 1958, p. 93-97.

Electron diffraction studies of reactions of mild steel with sulphur, and with hydrogen sulphide. All the known forms of iron sulphide were formed under characteristic conditions. In addition a previously unknown cubic iron sulphide was observed. It appears to have a structure analogous to that of  $\gamma\text{-Fe}_2\text{O}_3$ . 7 ref. (R7k, M22n; ST)

**432-R.** (French.) Behavior of Coatings in Association With Cathodic Protection. B. Raclot. *Métaux Corrosion-Industries*, no. 391, Mar. 1958, p. 108-114.

Cathodic anticorrosion method is rarely used without some preliminary surface treatment and the behavior of the surface treatment must be studied in association with the cathodic protection. Results of a study in which the current density giving the protective potential is determined for a steel U tube with bituminous coating immersed in a saturated sodium chloride solution. Possibility of surface blisters presents a major problem. (R10d, L26a)

**433-R.** (German.) Corrosion in Building Materials. S. Baker and E. Carr. *Bitumen-Teere Asphalte-Peche und Verwandte Stoffe*, Mar. 1958, p. 82-83. (R3, T26n)

**434-R.** (German.) Factors Inhibiting Corrosion and Their Special Application. Karl-Hermann List. *Erdöl und Kohle*, v. 11, Feb. 1958, p. 86-88. (R10b)

**435-R.** (German.) Oxidizing Speed of Titanium in Fused Salt and the Joining of the Oxidized Products. M. E. Straumanis and Ch. Chiou. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie*, v. 62, no. 2, 1958, p. 201-209. (R6j, R1h; Ti)

## Inspection and Control

**370-S.** Spectrophotometric Determination of Rhodium and Platinum in Plutonium. Maynard E. Smith. *Analytical Chemistry*, v. 30, May 1958, p. 912-913. (S11k; Rh, Pt, Pu)

**371-S.** Volumetric Determination of Aluminum in Presence of Iron, Titanium, Calcium, Silicon and Other Impurities. H. L. Watts. *Analytical Chemistry*, v. 30, May 1958, p. 967-970. 6 ref. (S11j; Al)

**372-S.** Separation and Spectrophotometric Determination of Microgram Amounts of Niobium. Glenn R. Waterbury and Clark E. Bricker. *Analytical Chemistry*, v. 30, May 1958, p. 1007-1009. (S11k; Nb)

**373-S.** Gamma Spectrometric and Radiochemical Analysis for Impurities in Ultrapure Silicon. Barbara A. Thompson, Barbara M. Strause and Maurice B. Leboeuf. *Analytical Chemistry*, v. 30, June 1958, p. 1023-1026. (S11c, S11q; Si-a, 9-51)

**374-S.** Determination of Zirconium in Titanium Alloys Using p-Bromop-Chloromandelic Acid. Roland A. Papucci and Joseph J. Koenigsberg. *Analytical Chemistry*, v. 30, June 1958, p. 1062-1064. (S11j, Ti-b, Zr)

**375-S.\*** Determination of Acid Soluble Aluminum in Steel. E. T. Saxer. *Blast Furnace and Steel Plant*, v. 46, May 1958, p. 489-492. 7 ref. (S11b; Al, ST)

**376-S.** Analytical Applications of Dutoit's Thermovolumetry. Pt. 2. Analysis of Zinc in Brass. Kumar Krishna Chatterji. *Indian Chemical Society, Journal*, v. 35, Jan. 1958, p. 57-62. (S11j; Cu-n, Zn)

**377-S.** Control of Magnesium Alloy Castings. Chester Gadzinski and Richard W. Hooley. *Industrial Quality Control*, v. 14, Nov. 1957, p. 14-19. Consideration of secondary controls; destructive testing, proof loading testing and chemical analysis, used to measure effectiveness of primary controls over physical properties of magnesium alloy casting. 4 ref. (S12, E-general; Mg-b)

**378-S.** Modern Spectrographic Analysis of Steel Works Materials. D. Manterfield. *Instrument Practice*, v. 12, Apr. 1958, p. 359-366. (S11k; ST)

**379-S.** The Challenge of Standards in the Steel Industry. John W. Sullivan. *Magazine of Standards*, May 1958, p. 129-132.

Technical problems of standardization. (S22, ST)

**380-S.** Gamma Spectroscopy Applied to Radioactivation Analysis. Pt. 3. Determination of Cobalt in Iron Using Gamma-Gamma Coincidence Measurement. United Kingdom Atomic Energy Authority, AERE C/R 2377, 1958, 13 p. 10 ref. (S11q; Co, Fe)

**381-S.** Gamma-Radiography. The Economic Factors. L. Spiro. *Welding and Metal Fabrication*, v. 26, May 1958, p. 188-189. (S13e, 17-53)

**382-S.\*** (German.) Magnetic Separation of Electrolytically Isolated Structural Components of Metallic Materials. Walter Koch and Heinz Sundermann. *Archiv für das Eisenhüttenwesen*, v. 29, Apr. 1958, p. 219-224.

Apparatus and its operation. Technique of separation of cementite and special carbides. Chemical and radiological examination of separated particles. (S11f; ST)

**383-S.** (German.) Sources of Error in Determining Graphite in Gray Cast Iron. Herbert Auerbach. *Giessereitechnik*, v. 4, Mar. 1958, p. 60-61. (S11; CI, C)

**384-S.** Differential Spectrophotometric Determination of Zirconium in Presence of Hafnium. Harry Freund and W. Floyd Holbrook. *Analytical Chemistry*, v. 30, Apr. 1958, p. 462-465. (S11a, Zr, Hf)

**385-S.** Determination of Tantalum in Niobium. Mary Louise Theodore. *Analytical Chemistry*, v. 30, Apr. 1958, p. 465-467. 15 ref. (S11, Nb, Ta)

**386-S.** Polarographic Determination of Tin in Zirconium Alloys. John T. Porter. *Analytical Chemistry*, v. 30, Apr. 1958, p. 484-485. (S11m, Sn, Zr-b)

**387-S.** Photometric Determination of Beryllium. Uno T. Hill. *Analytical Chemistry*, v. 30, Apr. 1958, p. 521-524. (S11a, Be)

**388-S.** Conductometric Determination of Small Amounts of Oxygen in Titanium. Maurice Codell and George Norwitz. *Analytical Chemistry*, v. 30, Apr. 1958, p. 524-526. 17 ref. (S11j; Ti, O)

**389-S.\*** A Portable Lamination Detector for Steel Sheet. B. O. Smith, A. P. H. Jennings and A. G. Grimshaw. *British Journal of Applied Physics*, v. 9, May 1958, p. 191-193.

Method of detecting laminations in steel sheet based on the distortion they cause in the flow pattern of an electric current through the sheet. Direct current is passed through the sheet between two contacts on opposing faces while the potential difference between two adjacent contacts is measured. This potential difference is very small in sound material but rises sharply if a lamination is present. (S13c; ST, 4-53)

**390-S.** Government Specifications for Aluminum. *Design News*, v. 13, Apr. 14, 1958, p. 152.

Most frequently used Federal and U. S. military specifications and their nearest corresponding ASTM, SAE and AMS numbers, together with chemical analysis and specified forms. (S22; Al-b, 15-74)

**391-S.\*** Cutting Costs Through Quality Control. Kenneth M. Smith. *Foundry*, v. 86, June 1958, p. 65-69.

Cost-saving advantages in a control program which measures statistically the influence of each sort of casting defect on the average of

- all jobs of a given type.  
(S12, E-general, 17-23)
- 392-S.** Instrumentation for Iron and Steel. B. O. Smith. *Iron and Coal Trades Review*, v. 176, May 16, 1958, p. 1147-1152.  
(S18, S14, S16, D-general)
- 393-S.** Determination of Niobium in the Presence of Large Amounts of Titanium. A. I. Ponomarev and A. Ya. Sheskol'skaya. *Journal of Analytical Chemistry of the USSR*, v. 12, 1957, p. 369-371.  
Rapid and accurate method based on precipitation of Nb with tannin in 5% hydrochloric acid solution in the presence of ascorbic acid which forms a complex with Ti. 6 ref.  
(S11, Ti, Nb)
- 394-S.** A Spectrographic Method of Determining Scandium in Minerals, Ores, and Process Product. S. M. Solodovnik, A. K. Rusanov and A. I. Kondrashina. *Journal of Analytical Chemistry of the USSR*, v. 12, 1957, p. 387-390.  
9 ref. (S11c, Sc, RM-n)
- 395-S.** The Spectrographic Determination of Calcium and Zirconium in Bismuth-Uranium Alloys. R. C. Smart and M. S. W. Webb. *United Kingdom Atomic Energy Authority, A.E.R.E. C/R. 2117*, Dec. 1957, 8 p.  
10 ref. (S11c, Bi, U, Ca, Zr)
- 396-S.\*** Nondestructive Testing Applied to Railroad Materials and Equipment. A. S. Pedrick. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 21-35.  
Magnetic particle inspection, Zygo fluorescent penetrant inspection, ultrasonic reflectoscope inspection and radiography applied to the quality control of materials and inspection of parts. (S13)
- 397-S.\*** Nondestructive Testing of Uranium. Gerold H. Tenney. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 36-48.  
Uranium ranging in thickness from a few mils up to about 2½ in. has been radiographed successfully, using sources of different energies. Typical exposure charts, respective film-screen combinations, the use of vacuum cassettes and the problem of shielding against object and room scatter. Use of radiation gages to measure the uniformity of mass per unit area and the application of ultrasonics. 8 ref. (S13e; U)
- 398-S.\*** Development of Techniques for the Detection of Cracks in Small Cylindrical Specimens by Reluctance Methods. Eugene Roffman. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 49-54.  
Three-coil reluctance test method, two magnetic loops passing through a test specimen which induce voltages in the detector coils. If no flaw exists, the reluctance of each magnetic loop is equal, resulting in a minimum signal at the output terminals. Tests on high-carbon heat-treated toolsteel specimens yielded no ambiguous results.  
(S13h; TS, 9-72)
- 399-S.\*** Ultrasonic Inspection of Aircraft Forgings. Alex Barath. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 71-78.  
Automatic equipment facilitates inspection of flat stock and regular shapes, while in most cases die forgings, because of geometry and grain flow, can best be inspected using a hand scanner and a hand-operated carriage. (S13g; 4-51)
- 400-S.** An Ultrasonic Technique for Non-Destructive Evaluation of Metal-to-Metal Adhesive Bonds. James S.

- Arnold. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 79-88.  
System loss (sonic energy absorption) can be related to bond quality. The relationship is sufficiently close to permit the use of loss observations as a basis for nondestructive bond evaluation. Apparatus for studying this relationship has been constructed. (S13g, K12, 7-59)
- 401-S.\*** Nondestructive Testing of Bonded Metal Sandwich Structures. Richard E. Anderson. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 89-99.  
Test sandwich panels were 0.004-in. gage foil, 0.25 in. cell diameter aluminum-honeycomb sandwiched between two 0.051 by 10 by 10-in. clad Al facing sheets. Optimum frequency for the ultrasonic examination of metal-honeycomb sandwich specimens was 5 Mc. (S13g; Al, 8-66)
- 402-S.** (French.) Determination of Aluminum and Titanium in Modified Heat Resistant Refractory 80-20 Nickel-Chromium Alloys. V. Duriez and J. Barboni. *Revue du Nickel*, v. 24, Jan-Feb-Mar. 1958, p. 11-16.  
(S11j; SGA-h, Ti, Al, Cr, Ni)
- 403-S.** (Italian.) Automatic Determination of Chromium, Manganese and Vanadium in Steel by Means of the Coulometer. A. Liberti and L. Clavatta. *Metallurgia Italiana*, v. 50, Feb. 1958, p. 50-52.  
3 ref. (S11j; ST, Cr, Mn, V)
- 404-S.** (Japanese.) Carbon Determination in Titanium and Titanium Alloys. Yasumoto Otake. *Light Metals (Tokyo)*, v. 8, Mar. 1958, p. 59-69.  
11 ref. (S11b; Ti, C)
- 405-S.** (Japanese.) Hydrogen Determination in Titanium and Titanium Alloys. Yasumoto Otake. *Light Metals (Tokyo)*, v. 8, Mar. 1958, p. 70-78.  
11 ref. (S11r; Ti, H)
- 406-S.** (Russian.) Colorimetric Determination of Thallium in Ores. N. T. Voskresenskaya. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 395-398.  
7 ref. (S11a; Th, RM-n)
- 407-S.** (Russian.) Photocolorimetric Determination of Silicon in Copper Alloys. E. I. Nikitina. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 398-402.  
6 ref. (S11a; Si, Cu-b)
- 408-S.** (Russian.) Amperometric Titration of Manganese by Use of Sodium Ferrocyanide. I. L. Teddorovich and M. K. Abramov. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 406-407.  
(S11j; Mn)
- 409-S.** (Russian.) Spectral Analysis of Copper-Manganese Alloys. V. D. Kovalenko. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 455-457.  
(S11K; Cu-b, Mn-b)
- 410-S.** (Russian.) Spectral Determination of Magnesium in Pig Iron and Graphite. K. I. Ionova and S. A. Genshaft. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 459-460.  
4 ref. (S11k; Mg, CI-a)
- 411-S.** (Russian.) International Basis for Standardizing Mechanical Testing of Metals. L. T. Timoshuk. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 487-488.  
(S22, Q-general)
- 412-S.** (Russian.) Spectroscopic Analysis of Nonferrous Metals. V. V. Nedler and V. L. Ginzburg. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 507-508.  
(S11k; EG-a38)
- 413-S.\*** (Spanish.) Ultrasonic Energy in Metallurgical Processes. Jose Ors

- Martinez. *Instituto del Hierro y del Acero*, v. 11, Jan-Mar. 1958, p. 24-38.
- Equipment and methods used in sonic energy generation, and application to detection of defects in iron and steel castings. Devices used with detector equipment permit calculations of elastic characteristics on basis of measurement of speed of propagations of longitudinal and transverse waves in material tested. 25 ref. (S13g, Q21f, 1-74)
- 414-S.** Colorimetric Determination of Tungsten in Scheelite Ores and Mill Products. R. P. Hope. *Australasian Institute of Mining and Metallurgy, Proceedings*, no. 185, Mar. 1958, p. 51-64.  
8 ref. (S11a; W, RM-n)
- 415-S.** Gravimetric Determination of Thorium and Its Separation From Uranium, Cerite Earths and Cerite Salts. G. M. Saxena and T. R. Shashtri. *Indian Academy of Sciences, Proceedings*, v. 47A, Apr. 1958, p. 238-243.  
22 ref. (S11b; Th, U, Ce)
- 416-S.** Phosphate-Hydroxyquinoline Method for Separation and Volumetric Determination of Zirconium. A. V. Vinogradov and V. S. Shpinel. *Soviet Journal of Atomic Energy*, v. 3, 1957, p. 895-900. (Translation by Consultants Bureau, Inc.)  
18 ref. (S11j; Zr)
- 417-S.** Nondestructive Testing. *Steel*, v. 142, June 23, 1958, p. 110-112.  
Quality measurements with resonance, pulse-reflection ultrasonics, eddy current instruments, radiography, penetrants and magnetic particles. (S13, S14, 1-53)
- 418-S.\*** How Statistical Techniques Helped Achieve Better Uniformity in Unalloyed Titanium. Chester R. Smith. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 164-169.  
Data were collected and analyzed to establish quantitatively the amount of variation within ingots and from ingot to ingot. Brinell hardness of ingots and mechanical properties of finished products were used as the criteria for uniformity. (S12, Q-general, Q29n; Ti, 5-59)
- 419-S.\*** Determination of Gaseous Elements in Titanium. Robert M. Fowler. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 197-208.  
Simple, rugged vacuum fusion apparatus for oxygen and hydrogen; variations in technique required to handle different types of samples. Special iron crucibles for powdered samples and examples of their use in the analysis of sponge titanium. 13 ref. (S11r, 1-53; Ti)
- 420-S.** Examination of Uranium-Molybdenum and Uranium-Niobium Alloys for Irradiation Tests. J. R. Murray and F. L. Jagger. *Atomic Energy Research Establishment, AERE MM-182*, Dec. 1957, 12 p.  
Preparation and metallographic examination of ten uranium alloy specimens for irradiation tests. (S19; U-b, Mo-b, Nb-b)
- 421-S.** (Czech.) Thermogravimetric Analysis on Isolating Structural Constituents of Steels and Alloys and Pyrolytic Curves of Carbides. Hanus Tuma. *Hutnické Listy*, v. 13, no. 4, 1958, p. 315-319.  
Gravimetric determination of the presence of hydroxide in the isolate; evaluates thermogravimetric curves by example of the temperature range of decomposition and weight changes belonging to individual

- components of the isolate. 4 ref. (S11b, ST)
- 422-S. (German.) **A Rapid Method for the Separation of Tantalum From Niobium and of the Mixed Oxides From Zirconia.** B. S. Krishna Rao, D. V. N. Sarma and Bh. S. V. Raghava Rao. *Fresenius' Zeitschrift für Analytische Chemie*, v. 160, Mar. 19, 1958, p. 351-353.  
Procedure for separation based on the differences in solubility of morin complexes in acetone and alcohol. (S11d; Cb, Zr, Ta)
- 423-S. **Metals Analysis With Theno-ytrifluoroacetone.** Fletcher L. Moore. *American Society for Testing Materials, Preprint*, no 100a, 1958, 13 p.  
Principle of the liquid-liquid extraction technique involving TTA and a survey of extraction systems using TTA in metals separations. 26 ref. (S11q)
- 424-S. **Detection of Uncombined Oxygen in Zirconium Metal.** Louis Silverman and Wanda Bradshaw. *Analytica Chimica Acta*, v. 18, Mar. 1958, p. 253-258.  
7 ref. (S11r; Zr, O)
- 425-S. **Determination of Hydrogen in Magnesium by Combustion.** Maurice Codell and George Norwitz. *Analytica Chimica Acta*, v. 18, Apr. 1958, p. 265-269.  
14 ref. (S11r; Mg, H)
- 426-S. **The Polarographic Determination of Lead in Tin-Base Alloys.** M. Ariel and P. Enoch. *Analytica Chimica Acta*, v. 18, Apr. 1958, p. 339-344.  
14 ref. (S11m; Pb, Sn-b)
- 427-S. **The Polarographic Determination of Indium in Zinc-Base Alloys. Pt. 1. General Introduction. The Application of the Linear Sweep Cathode Ray Polarograph.** G. F. Reynolds and H. I. Shalovsky. *Analytica Chimica Acta*, v. 18, Apr. 1958, p. 345-349.  
11 ref. (S11m; In, Zn-b)
- 428-S. **Coulometric Determination of Chromium.** Louis Meites. *Analytica Chimica Acta*, v. 18, Apr. 1958, p. 364-372.  
13 ref. (S11a; Cr)
- 429-S. **The Determination of Aluminum, Nickel, Cobalt, Copper, and Iron in Alnico.** Donald H. Wilkins and Louis E. Hibbs. *Analytica Chimica Acta*, v. 18, Apr. 1958, p. 372-375.  
8 ref. (S11e; Al, Ni, Co, Cu, Fe, SGA-n)
- 430-S. **Spectrochemical Analysis of a Nickel-Base High-Temperature Alloy.** P. V. Mohan and T. P. Schreiber. *Applied Spectroscopy*, v. 12, no. 1, 1958, p. 6-7.  
A single exposure point-to-plant spectrographic procedure. (S11k; Ni-b, SGA-h)
- 431-S.\* **Automatic Control in Steel Strip Manufacture.** G. Syke. *British Institution of Radio Engineers, Journal*, v. 18, Feb. 1958, p. 117-124.  
Thickness gages on strip rolling mills and their use for automatic screw control, measurement and control of extension on skin-pass or temper mills, and automatic sorting of steel sheet and tin-plate on cut-up lines. (S14, X20c, W23)
- 432-S. **Cold-Reduced Tinplate and Cold-Reduced Blackplate.** *British Standards Institution*. B.S. 2920, 1957, 15 p.  
(S22; ST, Sn, 8-65)
- 433-S. **A Rapid Determination of Nonmetallic Inclusions in Steel by Means of Electrolysis.** Jisuke Seki and Saburo Kitahara. *Scientific Research Institute, Journal*, v. 51, Dec. 1957, p. 215-224.  
5 ref. (S11f; ST, 9-69)
- 434-S. **The Determination of Plutonium as a Minor Constituent in Alloys With Lead, Tin and Bismuth.** K. W. Brooke, D. H. F. Atkins and E. N. Jenkins. *United Kingdom Atomic Energy Authority Research Group, AERE C/M 336*, Dec. 1957, 4 p.  
Plutonium determined by counting the alpha sources prepared by evaporating small aliquots of solutions prepared from binary alloys of Pu with Pb, Sn or Bi and of tertiary alloys of Pu and Bi with Pb or Sn. (S11j; Pu, Pb, Sn, Bi)
- 435-S.\* **The Semi-Quantitative Determination of Traces of Sodium, Potassium and Magnesium in Bismuth and Bismuth-Uranium Alloys.** R. J. Webb. *United Kingdom Atomic Energy Authority, AERE C/R 2116*, 1958, 7 p.  
The Bi or Bi-U alloy is converted to oxide and excited in the d-c arc under standardized conditions. A medium quartz spectrograph is used for recording the spectra which are evaluated by visual comparison with spectra of synthesized samples containing known concentrations of Na, K and Mg. (S11k; Bi, U, Na, K, Mg)
- 436-S. **Analysis of Thorium-Boron and Uranium-Boron Alloys.** G. A. Barnett and G. W. C. Milner. *United Kingdom Atomic Energy Authority Research Group AERE C/R 2307*, 1958, 13 p.  
11 ref. (S11j; Th-b, B, U-b)
- 437-S. **Radiometric Determination of Uranium in Ores.** LaMar G. Evans and Carl Rampacek. *U. S. Bureau of Mines, Report of Investigation 5390*, Feb. 1958, 15 p.  
Empirical procedure for classifying the state of equilibrium in ores by measuring the radioactivity. Equilibrium method depends upon simultaneous measurement of the beta and gamma radiations given off by an ore. The apparent equivalent U content of the sample then is determined by comparing its beta activity with that of known assayed pitchblende standards in radioactive equilibrium. (S11q, S19; U, RM-n)
- 438-S. (English.) **Determination of Oxygen in Titanium by the Micro Bromination Method.** Mitsunao Takahashi, Makoto Kawane and Tetsuo Mitsui. *Mikrochimica Acta*, no. 5, Jan. 1957, p. 647-657.  
18 ref. (S11d; O, Ti)
- 439-S.\* (English.) **Spectral-Isotopic Method for the Determination of Hydrogen in Metals.** A. N. Zaidel. *Spectrochimica Acta*, v. 10, Feb. 1958, p. 369-376.  
Method using deuterium to compute hydrogen content of various metals. 12 ref. (S11r; H)
- 440-S.\* (English.) **Spectrographic Analysis of Ores by Introducing the Powder Into the Arc in a Stream of Air.** A. K. Rusanov and V. G. Khitrov. *Spectrochimica Acta*, v. 10, Feb. 1958, p. 404-418.  
New method for the spectrographic analysis of substances in powder form, using an alternating current arc, which is initiated by a high-frequency discharge, gives a significant increase in sensitivity and reproducibility, and reduces the time required for analysis. 9 ref. (S11k; RM-n)
- 441-S. (German.) **Role of the Chemist in the Production of Metallic Uranium and Thorium.** G. Wirths. *Acta Physica Austriaca*, v. 11, no. 4, Spring 1958, p. 471-481.  
15 ref. (S11; U, Th)
- 442-S. (German.) **Determination of Metallic Impurities in Ultrapure Antimony by the Dithizone Method.** Erich Haberli. *Fresenius' Zeitschrift für Analytische Chemie*, v. 160, Feb. 1958, p. 15-20.  
8 ref. (S11; 9-51; Sb-a)
- 443-S. (German.) **Volumetric Analysis of Phosphorus and Arsenic in Unalloyed Steel by the Differential Method With Quinolineammoniummolybdate.** S. Meyer and O. G. Koch. *Fresenius' Zeitschrift für Analytische Chemie*, v. 160, Mar. 3, 1958, p. 253-258.  
5 ref. (S11j; P, As, CN)
- 444-S. (German.) **Photometric Determination of Aluminum in Alloyed Steels.** Helmut Lillie and Hartmut Rosin. *Fresenius' Zeitschrift für Analytische Chemie*, v. 160, Mar. 3, 1958, p. 261-267.  
(S11a; Al, AY)
- 445-S. (German.) **Photometric Determination of Titanium by Extraction as Tributylammonium-Titanium-Sulfosalicylate.** Max Ziegler, Oskar Glemser and Adolf Von Baecann. *Fresenius' Zeitschrift für Analytische Chemie*, v. 160, no. 5, 1958, p. 324-332.  
9 ref. (S11a; Ti)
- 446-S. (German.) **Contribution to Trace Analysis. Pt. 1. Analysis of Aluminum and Aluminum Alloys.** O. G. Koch. *Mikrochimica Acta*, no. 1, 1958, p. 92-103.  
(S11d; Al)
- 447-S. (German.) **Are Ex-Electrons Suitable for Nondestructive Testing?** E. Schmid and K. Lintner. *Schweizer Archiv*, Mar. 1958, p. 79-89.  
41 ref. (S13e)
- 448-S. (German.) **Spectroscopic Analysis of Metals, Alloys and Ores.** W. Nabholz. *Schweiz. Technische Zeitschrift*, no. 21, May 23, 1958, p. 449-455.  
(S11k)
- 449-S. (Russian.) **Checking Steel for Microcracks by Using Graded Samples.** I. V. Samolov. *Stal'*, v. 18, Mar. 1958, p. 244-245.  
Use of graded samples is of advantage only for stable high-quality steels. For other grades of steel a more efficient method should be substituted. 4 ref. (S13; ST, 9-72)
- 450-S. (Pamphlet.) **Steel Products Manual. Alloy Steel Sheets and Strip.** Apr. 1958, 37 p. American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y.  
Information for purchasers on tolerances, testing, terminology and manufacture. (S22, Q-general, AY, 4-53, 17-55)
- 451-S. (Pamphlet.) **Steel Products Manual. Flat Rolled Electrical Steel.** Jan. 1958, 39 p. American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y.  
Information for purchasers on tolerances, testing, terminology and manufacture. (S22, Q-general, ST, Si, 4-53, SGA-n, 17-55)
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Symposium sponsored by ASTM Committee E-7, Los Angeles, Calif., Sept. 17-18, 1956. Pertinent papers abstracted separately. (S13, S14)
- 453-S. (Book.) **Standards Manual for Copper and Copper-Base Alloy Mill Products.** 181 p. 1958. Copper & Brass Research Association, 420 Lexington Ave., New York 17, N. Y.  
Standards for plates, sheets, strips, rods, bars, wire, pipe, tubes and shapes; tables, glossary. (S22; Cu-b)

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- Phase diagrams and other properties of uranium alloys low in Cr, Al, Mo, Zr and Nb and uranium alloys higher in Mo and Zr. 20 ref. (T11g, 17-57, M24, P-general; U-b)
- 285-T.\* (Czech.) Coatings of Reactor Fuel Elements.** Bohumil Prenosil. *Hutnické Listy*, v. 13, no. 4, 1958, p. 330-334.  
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- 286-T.\* High Temperatures Spur Use of Nickel-Base Alloys. Pt. 2.** T. E. Kihlgren. *Aviation Age*, v. 28, Mar. 1958, p. 130-134, 136-137.  
Inconel, Inconel X, Inconel W, Inconel 702, Inconel 713C, Inconel 700, offer great promise as heat resistant materials for aircraft and missiles. (T24, 17-57; Ni, SGA-h)
- 287-T. Buildings Cast in Iron.** Fredric Evans. *British Steelmaker*, v. 24, June 1958, p. 178-179.  
(T26n, 17-57, A2; CI)
- 288-T. New Carbide Dies Bring Big Savings at Low Cost.** R. Dover. *Canadian Machinery*, v. 69, p. 160, 162.  
Spark erosion is used to make blanking and piercing dies from solid carbide blanks. (T6r, G24a)
- 289-T. Is Our Future With Cemented Diamond Cutting Tools?** C. B. Slawson. *Carbide Engineering*, v. 10, June 1958, p. 15-18.  
Problems involved in manufacturing larger man-made diamonds and possible tool applications. (T6n; NM-k37)
- 290-T. Metallurgy.** H. A. Holden. *Chemical and Process Engineering*, v. 39, Mar. 1958, p. 82-85.  
Metals in atomic energy industry; welding developments; Al and Mg. 65 ref. (T11, 17-57, K-general; Al, Mg)
- 291-T. Choosing Resistant Material for Plant Construction. Pt. 1.** Frank H. Slade. *Chemical Products and Chemical News*, v. 21, June 1958, p. 213-217.  
Stainless steel as a material of construction for chemical plant. (T29, 17-57; SS)
- 292-T. Magnesium Branches Out.** *Diamond*, v. 21, Mar. 1958, p. 25-27.  
Nonstructural uses. (T-general, 17-57; Mg)
- 293-T. The Application of Modern Steels to Marine Construction. Pt. 1. Metallurgical and Welding Aspects. Pt. 2. Design Aspects.** Leon C. Bibber and John A. Gilligan. *Engineering Sciences, Technical Paper*, v. 5, no. 1, 1957, 12 p.  
(T22, 17-57, K-general, 17-51; ST)
- 294-T. The Development of Columbium and Tantalum.** *Mining Journal*, v. 250, Mar. 21, 1958, p. 325-326.  
Use of Nb and Ta in relation to turbo jet engines, guided missiles, rockets and nuclear energy. (T24, 17-57; Nb, Ta)
- 295-T. Niobium Technology.** *Nuclear Technology Briefs—Reactor Materials*, Mar. 19, 1958, p. 2-9.  
22 ref. (T11, 17-57; Nb)
- 296-T. Plutonium—a Reactor Fuel.** *Nuclear Technology Briefs—Reactor Materials*, Mar. 19, 1958, p. 10-14.  
(T11g, 17-57; Pu)
- 297-T. Use of Materials at Temperatures up to 2000° F.** Harry A. Pearl. *Society of Automotive Engineers, Preprint*, v. 46B, Apr. 1958, 18 p.  
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- 298-T. Aluminum for the Dairy In-**

- dustry.** J. C. Bailey. *Society of Dairy Technology, Journal*, v. 11, Apr. 1958, p. 50-58.  
10 ref. (T3s, 17-57; Al-b)
- 299-T. Stainless Steels: Their Uses and Maintenance in the Dairy.** G. H. Botham and J. R. Cuttall. *Society of Dairy Technology, Journal*, v. 11, Apr. 1958, p. 59-66.  
(T3s, 17-57; SS)
- 300-T.\* Head-End Processes for Dissolving Stainless Steel. UO<sub>2</sub> Dispersion-Type Fuel Elements.** F. S. Martin and M. J. Waterman. *United Kingdom Atomic Energy Authority, AERE C/R 2454*, 1958, 13 p.  
Two methods have been devised: treatment with methane, ammonia or sodium cyanide at high temperatures to introduce carbon or nitrogen into the steel and thus alter its characteristic structure; and by making the steel element a consumable anode in a nitric acid electrolytic bath. (T11g, 17-57; SS)
- 301-T.\* Some Studies of the Reaction Between Sodium and Bismuth.** R. I. Haas. *United Kingdom Atomic Energy Authority, AERE R/M 138*, 1957, 11 p.  
In a circulating fuel, liquid-metal-fueled reactor, a secondary liquid metal coolant circuit is likely to be used. Use of a solution of uranium in bismuth as a fuel and sodium as a secondary coolant. An exothermic reaction occurs between Na and Bi leading to a high-melting point intermetallic compound. (T11g, 17-57; U, Bi, Na)
- 302-T.\* AISI and Stainless Steels for Aerodynamic Applications.** J. T. Milek and B. L. Molander. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 217-233.  
AISI steels are not normally considered for aerodynamic applications as such, but are utilized as supporting members in applications such as landing gear and wing attach fittings. Stainless steels are used in basic applications such as wing skins. Alloys used include precipitation hardening types 17-7 and 17-4, 19-9 DX, Type 302, in the cold worked condition and types 310 and 312 when excessive temperatures are encountered. 6 ref. (T24, 17-57; SS)
- 303-T. (German.) Sintered Bimetallic Bearings.** W. W. Saklinski. *Maschinenbau Technik*, Nov. 1957, p. 577-580.  
(T7d, 17-57, H15)
- 304-T. (German.) Formation of Cutting Tool Bits.** Kurt R. Pawlowitz. *Technik und Betrieb*, v. 10, Apr. 1958, p. 41-42.  
(T6n)
- 305-T. (German.) Light Metals as Structural Materials for the Transportation and Communication Industry.** Heinz Anders. *Verkehr und Technik*, v. 11, Apr. 1958, p. 89-90.  
6 ref. (T-general, 17-57, 18-51, 18-52; EG-a39)
- 306-T. (Rumanian.) A Study of Porous Iron Bearings With Improved Wear Properties.** G. Dan, O. Stefan and A. Protopopescu. *Studii si Cercetari de Metalurgie*, v. 2, no. 4, 1957, p. 465-481.  
On the basis of tests it is concluded that it is possible to obtain from oxide powders material which has a resistance to wear comparable with that of material from electrolytic iron powders. 5 ref. (T7d, 17-57, Q9n; Fe, 6-71)
- 307-T. (Rumanian.) Strontium-Containing Metallurgical Cements.** A.

- Branski. *Studii si Cercetari de Metalurgie*, v. 2, no. 4, 1957, p. 545-551.
- New alkaline earth cements in the form of strontium metallurgical cements were obtained from ordinary basic slag (of calcium) and cement clinker containing strontium (silicate cement based on 3SrO.SiO<sub>2</sub>). These were found to be better for marine construction than portland, aluminum and calcium cements up to now used for marine construction. 5 ref. (T22, 17-57, A11d; NM-f43, RM-q, Sr)
- 308-T. (Russian.) Rational Design of Rail Grooves.** B. S. Shapiro. *Stal*, v. 18, Mar. 1958, p. 227-230.  
6 ref. (T23q, 17-51)
- 309-T. (Book.) Fuel Elements Conference.** Book 1, 811 p. 1958. U. S. Office of Technical Services, TID-7546, Washington 25, D. C. \$7.  
Conference under joint sponsorship of the U. S. Atomic Energy Committee and French Commissariat à l'Energie Atomique (CEA). Fuel element fabrication practices and behavior of fuel elements under in-pile irradiation and when subjected to corrosive media. Papers abstracted separately. (T11g)
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- 313-W. Selection of Arc Furnace Transformers With Consideration to Maintenance.** E. G. Ashbaugh. *Blast Furnace and Steel Plant*, v. 46, May 1958, p. 478-481, 488.  
(W11r, 2-52, D5)
- 314-W. Automation in Heating and Quenching. Pt. 2.** Norbert K. Koebel. *Industrial Heating*, v. 25, May 1958, p. 908, 910, 912, 914, 916.  
Equipment for automating the heating and quenching of very large bulky parts, such as landing gear components, jato tubes for guided missiles and similar parts in the aircraft industry. Automation is applied to control of furnace atmosphere as well as to material handling. (Concluded.) (W27, W12, 18-74)
- 315-W. Fume Problem of Basic Oxygen Steelmaking Process Solved by Electrostatic Precipitation.** *Industrial Heating*, v. 25, May 1958, p. 962, 964.  
Cottrell electrostatic precipitator, operating with an efficiency of 99.5%, is the first commercial application of an electrostatic precipitator to clean exhaust gases from an oxygen converter. (W13c, D10)
- 316-W. Rolling Mill Slippers: Design.** F. J. Gieve. *Iron and Steel Engineer*, v. 35, May 1958, p. 127-128.  
(W23, T7d, 17-51; Cu-s)
- 317-W. Rolling Mill Slippers: Materials.** R. J. Severson. *Iron and Steel Engineer*, v. 35, May 1958, p. 129-130.  
(W23, T7d, 17-57; Cu-s)
- 318-W. Design of Press Structures. Pt. 2. Tie Rod Shrinking.** *Modern Industrial Press*, v. 20, May 1958, p. 31-34.  
Theory of tie rod shrinking and relationship between stresses in tie rods and parts of the press frame. Details for shrinking and methods for heating tie rods. (W24g; 17-51)
- 319-W. (Italian.) Proper Cupola Design.** Ottavio Barbavara di Gravelona. *Rivista di Meccanica*, v. 9, Mar. 15, 1958, p. 29-32.  
(W18d, 17-51)

**320-W.\*** (Japanese.) **A Permanent Wall-Type Furnace With Forced Cooling, Water-Cooled Basic Cupola.** Ryo-  
zo Sato. *Japan Foundrymen's Society, Journal*, v. 30, Mar. 1958, p. 152-158.

Basic practice can be operated by the application of water cooling method to melting zone of the cupola which has been lined with thin basic material. (W18d)

**321-W.** **Plastic Tooling Opens New Markets.** *Metal Forming and Fabricating*, v. 20, June 1958, p. 17-19.

Phenolics, polyesters and epoxies are being more widely used as dies. Advantages include low shrinkage, good machinability, high chemical resistance, excellent adhesion, low cost. (W24n, NM-d30)

**322-W.** **The All-Basic Openhearth.** *Metal Progress*, v. 73, June 1958, p. 85-87.

With hearth and walls already being constructed of basic material, the only area left to complete the all-basic openhearth is the roof. Work conducted by American and British steelmakers over the last few years indicates that higher production and longer roof life can be expected when problems imposed by the use of basic brick are solved. (W18r, D2, 1-65; RM-h, ST-e)

**323-W.** **Processing With Continuous Heating. An Economic Appraisal.** Frederic O. Hess. *Metal Progress*, v. 73, June 1958, p. 99-105.

The continuous furnace should be thought of as a processing tool. Many factors in its design and operation require a realistic appraisal. For example, rating a furnace on fuel efficiency and fuel costs can be deceptive. Most continuous furnaces today are not single-purpose devices and this must be considered in their evaluation. (W20h, W27, 1-61)

**324-W.** **A New Approach to Open Hearth Maintenance.** E. W. Hunziker and M. E. Strate. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 110-120.

Prefabricating an entire openhearth furnace and moving it into position results in less downtime, saving labor and money. (W18r, 18-71)

**325-W.** **Prefabricating New Fronts for Open Hearth Furnaces Saves Time and Money.** A. W. Schoenbeck. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 129-138. (W18r)

**326-W.** **Patching an Open Hearth Roof.** C. L. Meloy. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 138-146. (W18r; RM-h)

**327-W.** **Progress Report on Basic Construction.** A. H. Sommer. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 175-179. (W18r, 1-65; ST)

**328-W.** **Progress Report on Flat Basic Roof Installation.** J. F. Pollock. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 180-183. (W18r, 1-65; ST, RM-h)

**329-W.** **Progress Report on All-Basic Roofs at Laclede Steel Co.** L. D. Yager. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 183-184. (W18r, 1-65; ST, RM-h)

**330-W.** **Progress Report on Flat Basic Open Hearth Roof at Inland Steel Co.** P. W. Nutting. *National Open Hearth Steel Committee Pro-*

*ceedings*, v. 40, 1957, p. 184-190. (W18r, 1-65; ST, RM-h)

**331-W.** **Use of Basic Refractories for Open Hearth Roofs and Checkers.** C. W. Cravens. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 191-207.

Use of electrocast brick gives results somewhat similar to those of conventional metal-encased brick in combination with silica brick. The initial trial of basic checkers was unsatisfactory because of excessive spalling. (W18r, 1-65; ST, RM-h)

**332-W.** **Use and Economics of Basic Runners.** Anthony R. Edwards. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 219-225.

Basic runners are far superior to the brick runners in point of service and they operate at a great economic saving. (W18r, D9n; RM-h)

**333-W.** **Mechanical Aids to Openhearth Repairs.** M. H. Weir. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 226-230.

Large materials handling machinery reduces downtime during repair work. (W18r, W12, 18-72)

**334-W.** **Advantages of an All-Basic Furnace in a Cold-Metal Shop.** Lewis B. Lindemuth. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 230-235.

Advantages with basic roof and basic end construction, contrast with the previous general silica construction on the 175-ton openhearth furnaces. (W18r, 1-65; ST, RM-h)

**335-W.** **Experiments With Fuel-Fired Jet Atomizing Fuel-Oil Burners.** William Wood. *National Open Hearth Steel Committee Proceedings*, v. 40, 1957, p. 241-244.

Results demonstrate possibilities for improving combustion and increasing openhearth production. (W18r; RM-k30)

**336-W.** (German.) **Use of Hard Metals for Punch Construction.** G. Vieregge. *Das Industrieblatt*, v. 58, Apr. 1958, p. 129-132.

Economic expediency and limits of application. Construction of the punches; maintenance and reshaping. Suitable hard metals. Equipment for manufacturing punches. Applications and experiences. (W24p; 17-67; 6-69)

**337-W.** (German.) **Importance of Jigs for Punches and Dies in Forming of Sheets.** Kurt Venninger. *Das Industrieblatt*, v. 58, Apr. 1958, p. 133-135.

Influence of stamping regularity on the durability of tools. Construction of plate jig and column jig, their applications and advantages. Use of low melting alloys for repairing or manufacturing jigs designed for temporary application. (W25f, G1; SGA-d)

**338-W.\*** (Italian.) **Design and Specifications for a Special Furnace for Austenitizing Stainless Steel Sheet.** I. Montevicchi. *Metallurgia Italiana*, v. 50, Feb. 1958, p. 53-58.

Differential calculus was used to plan automated installation for treating large sheets of 18-8 and 20-25 Ni-Cr alloy. Installation includes conveyor system which handles materials by means of holes bored near edges, thus avoiding contact by any equipment with surfaces of sheet. Bored areas are removed by subsequent machining, which would be required in any case. (W27, W12r, 1-52, J22; SS, 4-53)

**339-W.** (Rumanian.) **Selenium, a Product New to the Rumanian Chemical**

**Industry.** A. Blankenburg. *Revista de Chimie*, Feb. 1958, p. 96-98.

Use of Se in electrolytic refining of Cu and other metals. 4 ref. (W17e, 17-57; Se, Cu)

**340-W.** **Big Billets. Aircraft Production.** v. 20, May 1958, p. 186-191. Installation of heavy equipment by Northern Aluminum for the production of plate for large integral airframe units. (W22, W27, T24a; 4-53)

**341-W.\*** **Barrelling. Preshaped Synthetic and Metal Chips.** *Aircraft Production*, v. 20, June 1958, p. 210-214. Synthetic preshaped chips for doing work on surfaces in restricted situations without risk of lodgement; and the use of shaped metallic media. (W2a, L10c, 1-52)

**341-W.** **A 40-Ton Arc Melting Furnace With Modern Electrical Equipment.** R. Lambert. *Brown Boveri Review*, v. 45, Feb. 1958, p. 88-94. (W18s, 1-52; ST, RM-p)

**343-W.** **Flap-Type Coated Abrasive Wheels.** Morroy Patterson. *Grinding and Finishing*, v. 4, June 1958, p. 30-38.

Polishing element is a series of coated abrasive leaves and flaps. The flaps are arranged in a circle to form a wheel. (W25c)

**344-W.** **Four-High Skinpass Mill and Electric Equipment to Nihon Tetsan Co., Ltd.** Hideyuki Yamamoto, Katsumi Fumiki, Masataka Nishi, Hideo Iwaki and Isamu Shiraki. *Hitchi Review*, v. 7, Mar. 1958, p. 3-13. (W23c)

**345-W.** **Modern Iron and Steel Plants. Layout, Handling, Power, and Costs.** Paul Rheinlander. *Iron and Coal Trades Review*, v. 176, May 30, 1958, p. 1261-1267. (From *Stahl und Eisen*, Jan. 9, 1958). (W10, W11, D-general, 17-53)

**346-W.** **Oxygen-Refining in the Open Hearth.** *Iron and Coal Trades Review*, v. 176, May 30, 1958, p. 1279-1281.

Design and use of an oxygen "gun" for decarburization of mild steel heats at the Steel Co. of Wales. (W18g, D2g, 1-52)

**347-W.** **Linings for Hot Metal Mixers.** F. H. McRitchie. *Refractories Institute, Technical Bulletin*, no. 98, Nov. 1957, 12 p.

Important design and service factors affecting life of hot metal mixer and car linings. 29 ref. (W18n; ST, RM-h)

**348-W.** **Developments in the Use of Refractories at the Abbey Melting Shop of The Steel Co. of Wales Ltd.** G. M. Workman. *Refractories Journal*, v. 34, May 1958, p. 204-222. (W18r; NM-h38)

**349-W.** **A Survey of General and Specialized Machine Tools for Press-Tool Production.** J. A. Waller. *Sheet Metal Industries*, v. 35, June 1958, p. 429-438. (To be continued.) (W25, W24)

**350-W.** **18 Ways to Move Parts in a Furnace.** Donald Beggs. *Steel*, v. 142, June 23, 1958, p. 90-91. Devices that are being used in automated heat treating lines. (W12g, W12r, W27p, 1-52)

**351-W.** **What to Look for in Abrasive Belt Machines.** J. Karl McLaughlin. *Tool Engineer*, v. 40, June 1958, p. 85-90. (W25s, 1-52)

**352-W.** (German.) **Two-Zone Heating and Holding Furnace for Light Metal Rolling Ingots, With Oil Firing and Waste Gas Recirculation.** P. Eck-

hoff. *Aluminium*, v. 34, May 1958, p. 263-265.

(W20h, 1-52; Al, 5-59)

**353-W.\*** (German.) **Sand Compression by Jolting.** Waldemar Gesell. *Gieserei*, v. 45, May 22, 1958, p. 295-300.

Description of test machine; compressed air consumption per number of jolts; mold hardness in relation to jolting duration, operating air pressure and height of molding box; jolting with postcompression; flaskless molding using jolting machines. (W19h, E18r)

**354-W.** (German.) **Waste Heat Utilization on Three-Flamed Furnaces in Lead Works.** Wilfried Wiese. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 11, May 1958, p. 217-219.

(W17g, A11e, 1-52; Pb)

**355-W.** (German.) **Recuperators for Gas Heated Aluminum Melting Furnaces.** Hans-Walter Fulda. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 11, May 1958, p. 219-221.

(W18r, 1-52; Al)

**356-W.\*** (Russian.) **Experience in Using Fourth Winding of Booster in Electric Furnace Regulator.** B. F. Delaveridi and M. M. Flaksman. *Stal'*, v. 18, May 1958, p. 425-427.

Automatic feed of electrodes of melting arc furnace during rapid disturbances of process using fourth control winding of standard booster. Scheme using titration. Scheme using maximal relay. (W18s)

**357-W.** **New Plant at Shepote Lane Rolling Mills.** *British Steel-maker*, v. 24, June 1958, p. 182-185.

Modern plant for production of wide stainless steel strip includes Sendzimir cold mill, 35 x 72 in., 2-high reversing roughing mill, reversing hot finishing mill now converted to a Steckel mill, and 4-high reversing cold reduction mill. (W23c, 1-52; ST)

**348-W.** **Mercury Arc Converters for Large Reversing Drives.** *British Steel-maker*, v. 24, June 1958, p. 186-188.

(W11r, W23n)

**359-W.** **Plastic Tools Get Steel Armor.** F. C. Livingstone. *Canadian Machinery*, v. 69, Mar. 1958, p. 106-107.

Plastic tools sprayed with metal. (W24n, L23; NM-d)

**360-W.** **These Filler Materials Stand the Heat.** A. M. Setapen. *Design Engineering*, v. 4, June 1958, p. 65-66.

(W29h, K8; SS, SGA-f)

**361-W.** **Low Frequency Induction Furnaces.** W. Von Asten. *Engineer and Foundryman*, v. 22, Feb. 1958, p. 35-37, 52.

(W18a)

**362-W.** **Describe Brazing Filler Metals for High-Temperature Service.** *Industrial Laboratories*, v. 9, June 1958, p. 74-75.

(W29h, K8; SS, SGA-f)

**363-W.** **Lubrication in Rolling Mills.** S. L. Norton. *Iron and Coal Trades Review*, v. 175, Nov. 8, 1957, p. 1097-1098.

(W23, 18-73)

**364-W.\*** **Development of a Remotely Operated Vacuum Induction Furnace.** G. M. Gillies and B. A. J. Lister. *United Kingdom Atomic Energy Authority, AERE C/R 2148*, 1957, 18 p. Furnace for melting and bottom-pour casting of uranium by remote operation on a scale up to 5 kg. (W18a, 1-73, W12a; U)

**365-W.** (Rumanian.) **Contribution to the Establishing of a Method of Calculating the Capacity of Crushers.** I. Huber Panu and Emil Popa. *Studi*

*si Cercetari de Metalurgie*, v. 2, no. 4, 1957, p. 499-522.

Method for computation of the capacity of sphere and rod-type crushers and of the principal dimensions which these machines must have in order to satisfy required crushing conditions. 11 ref. (W15n, 17-51)

**366-W.** (Russian.) **Methods for Reducing Down Time of Sintering Equipment.** D. P. Pritykin and A. V. Drimbo. *Stal'*, v. 18, Mar. 1958, p. 202-206.

Design improvement in trippers, screens, pebble mills, crushers, mixing drums, table feeders and other units of sintering equipment sharply reduced down time for repair. (W15n, W15p, B16, 1-52, 17-51, 18-71; Fe)

**367-W.** (Russian.) **Prolonging the Life of Blast Furnace Charging Equipment.** M. A. Tytkin, I. F. Parfentyev and V. I. Sivak. *Stal'*, v. 18, Mar. 1958, p. 207-208.

Life of charging equipment may be prolonged considerably by adopting certain constructional improvements and by careful elimination of overheating and sharp temperature fluctuations, and by the maintenance of a uniform furnace performance. (W12b, W17g, 1-52)

**368-W.** (Russian.) **Increasing the Durability of Large Ingot Molds by Reinforcement.** I. E. Brainin, I. I. Bornatsky and K. S. Alferov. *Stal'*, v. 18, Mar. 1958, p. 267-270.

(W19c; ST)

**369-W.** (Russian.) **Experience in the Design and Operation of Evaporative Cooling of Metallurgical Furnaces.** S. M. Andonyev. *Stal'*, v. 18, Mar. 1958, p. 271-280.

(W10f, 17-51)

**370-W.** (Book-German.) **Construction and Operation of Cupolas, 2nd Ed.** 382 p. 2 v. 1953, 1956. William Knapp-Verlag, Haale (Saale), Germany. \$2.65.

Design features and optimum procedures for engineers and foundrymen. (W18d, E10a)

## Instrumentation

Laboratory and Control Equipment

**49-X.\*** **Methods of Control of Strip Dimensions on Hot Finishing Mills.** R. A. Phillips. *Iron and Steel Engineer*, v. 35, May 1958, p. 100-106.

To hold finishing dimensions, hot strip mill must be set up accurately and stand speed regulated accurately. For this, positioning controls on screwdowns and speed regulators are necessary. Some type of automatic set-up of both screwdowns and speeds is foreseen. 5 ref. (X20c, W23c, 1-66)

**50-X.** **An Apparatus for Measurement of Thermal Conductivity of Solids at Low Temperatures.** Robert L. Powell, William M. Rogers and Don O. Coffin. *National Bureau of Standards, Journal of Research*, v. 59, Nov. 1957, p. 349-355.

7 ref. (X24, P11h, 1-53, 2-63)

**51-X.\*** **The Adiabatic Vacuum Calorimeter From 600 to 1600° C.** I. I. Backhurst. *Iron and Steel Institute, Journal*, v. 189, June 1958, p. 124-134.

Upper temperature limit of the adiabatic vacuum calorimeter has been extended from 950 to 1600° C.

It is adapted for either solid or liquid metal specimens and has been applied to the measurement of the thermal capacities of Ti from 590 to 1080° C., a 44% Cr-Fe alloy from 500 to 1100° C. and an alloy steel (1.09% Cr, 0.69% Mn, 0.31% C, and 0.20% Si) from 540 to 1600° C. 12 ref. (X24e, P11; Ti, Cr, Fe, AY)

**52-X.\*** **Three-Dimensional Tape-Controlled Inspection System.** H. J. Elton. *Machinery (London)*, v. 92, June 6, 1958, p. 1329-1332.

To permit continuous and automatic inspection of workpieces in three dimensions, a special measuring head has been developed which is sensitive to both vertical and horizontal deflections of the stylus. This head may be mounted on a machine arranged for automatic tape control, and the component may be caused to follow a path such that the various surfaces to be inspected are carried past the stylus. (X20, 1-52)

**53-X.** **The Use of a Computer in a Rolling Mill Office.** R. G. Massey. *Process Control and Automation*, v. 5, May 1958, p. 190-195.

Work carried out by the Operational Research Department of the British Iron and Steel Research Association. (X14, 1-52, F23, A9)

**54-X.\*** (Russian.) **Instruments for Maximum Geometric Measurements, Accessory Electromagnets for Coercive Force Meters Used for Controlling Quality of Thermal and Chemicothermal Treatment of Steel and Cast Iron Products.** M. N. Mikheev. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 44-52.

Coercive force meters equipped with accessory electromagnet can be used for accurate control of quality of heat treated products. All ranges of sizes of products encountered may be controlled whose hardened layer may vary from the thinnest nitrided layer to cases of considerable thickness. The instrument and process. 22 ref. (X11, 1-53, J28; ST, CI)

**55-X.** **Inspecting the Micro-Inch Surface Finish.** *Australasian Manufacturer*, v. 42, Mar. 15, 1958, p. 44-50.

(X3q, 1-53, S15)

**56-X.** **Differential Calorimeter for Heats of Formation of Solid Alloys. Heats of Formation of Alloys of the Noble Metals.** R. A. Oriani and W. K. Murphy. *Journal of Physical Chemistry*, v. 62, Mar. 1958, p. 327-331.

A twin differential, high-temperature calorimeter. Experimental results for the enthalpy of formation of solid Ag-Au, Au-Cu and Ag-Cu alloys. (X24e, P12r; Ag-b, Au-b, Cu-b)

**57-X.** (French.) **A New Surface Irregularity Measuring Instrument.** E. Fukushima. *Métaux-Corrosion-Industries*, no. 391, Mar. 1958, p. 125-132.

Instrument is based on the principle of optical reflection and its principal advantage is therefore freedom from vibrations such as encountered in instruments based on direct needle tracing of surface irregularities. Other advantages are rapidity of measurements, portability, ability to test directly and non-destructively with no special specimens required. Instrument gives a statistical measure of surface irregularities. 6 ref. (X23p, S15d, 1-53)

**58-X.** (German.) **Platinum in Chemical Laboratory Apparatus.** Manfred Röhm. *Chemie für Labor und Betrieb*, v. 9, Apr. 1958, p. 144-148.

(X21, 17-57; Pt)

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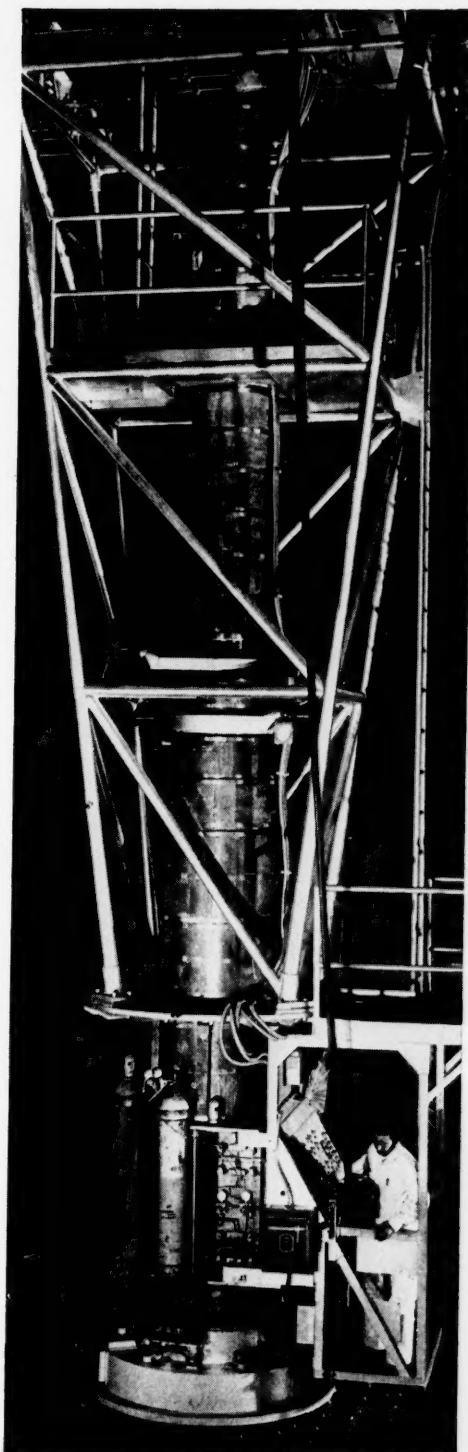
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**METALLURGIST (PHYSICAL):** United States Mint in Philadelphia has opening in supervisory position in nonferrous alloys using high-frequency melting, water-cooled mold casting, semi-automatic cold rolling into slabs and coils. Requires manufacturing coordination, production testing and quality control. Applicants must have at least two and a half years responsible professional experience in physical metallurgy, including at least two years of difficult and important research and/or production work. Position will be filled in accordance with applicable civil service procedures. Starting salary \$7510. Interested persons should file an Application for Federal Employment, Standard Form 57, with the Superintendent, United States Mint, 16th & Spring Garden Sts., Philadelphia 30, Pa. Applications available from first and second-class post offices.

### West

**WELDING ENGINEER:** A challenging opportunity with large engineering and construction firm for graduate engineer with minimum of three years experience, preferably in shop fabrication of field construction on pressure vessels, power and refinery piping. Bechtel Corp. designs and constructs steam, electric, hydro and nuclear power installations, refinery and chemical plants and large pipelines. Qualifying candidates must have working knowledge of manual arc, heli-arc, submerged arc, and processes for code welding. Work involves developing welding procedures, preparing specifications and advising design engineering and construction personnel. Job location in San Francisco and relocation expenses will be paid. Some traveling required. Send outline of personal history, experience and salary requirements to: George I. Copeland, Manager of Employment and Placement, Bechtel Corp., 150 Sansome St., San Francisco, Calif.

### POSITIONS WANTED

**MECHANICAL METALLURGIST:** Degree, 20 years experience in practical plant metallurgy, including specification writing and inspection of materials, plant problems. General plant experience in machining, fabricating, heat treatment, corrosion, brazing and design. Experience in carbon and alloy steels, stainless, nonferrous. Will relocate. Box 8-35.

**METALLURGICAL ENGINEER:** B.S. degree, age 29, single. Five years experience in outstanding research and development laboratories. Experience in alloy development, titanium and zirconium technology, brazing of reactive materials and honeycomb, mechanical testing. Desires responsible position in industrial development field. Any area considered, Midwest or West preferred. Box 8-40.

**METALLURGICAL ENGINEER:** B.S. degree, age 37. Twelve years ferrous metallurgy in production control and product development with mill equipment and roll manufacturers. Experienced in planning and organizing departments and plants, production scheduling, customer service, material selection, heat

### METALLURGISTS

B.S. recent grads with high scholastic standing. To conduct long-range research in the general field of fusion welding. These are permanent positions with a leader in the welding field. Laboratories located in suburban area of North Central New Jersey, 45 minutes from New York City. Excellent salaries, benefits, and growth potential. Submit complete history to: Personnel Manager, Air Reduction Research Labs, Murray Hill, N. J.

## WELDING RESEARCH

A Welding or Metallurgical Engineer is required for investigations into new and challenging areas of Welding and Brazing Research. Applicant should have at least a B.S. degree and several years of experience. Our opening offers the right man an unlimited opportunity for professional growth.

This is a permanent position in an expanding midwestern industrial research organization. Here is a challenging opportunity for the creative man who desires to work on stimulating and diversified research programs and in addition enjoy stimulating staff associations and an unusually pleasant working climate. Receive excellent salary and employee benefits.

If you are interested in this exceptional opportunity, send a complete resume to:

**Box 8-115, Meta's Review**

## PROCESS METALLURGIST

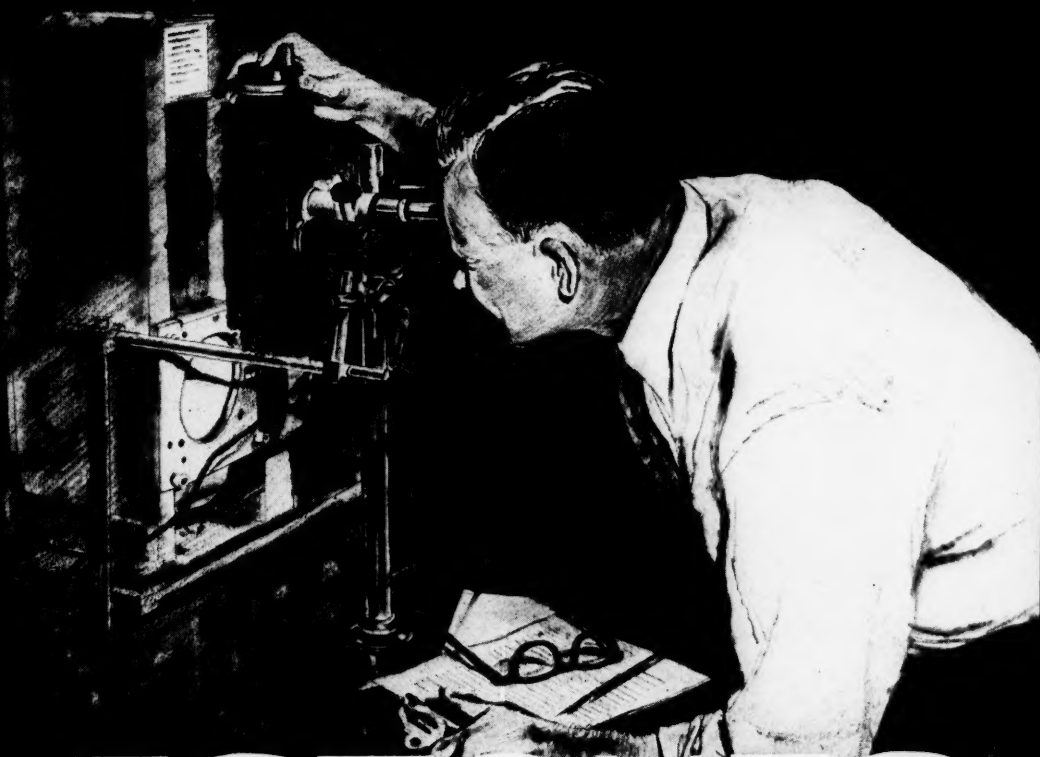
One of the nation's major oil tool and equipment manufacturers has responsible position with opportunity for growth for a graduate metallurgist or metallurgical engineer.

Minimum two years experience in ferrous metallurgy.

Responsibility would include: analysis of material failures, material evaluations, heat treating and plating problems relating to product development.

**CAMERON IRON WORKS, INC.**  
P. O. Box 1212  
Houston 1, Tex.

KAPL Metallurgist Richard L. Mehan taking a reading on a Zirconium alloy specimen being tested in a special strain-fatigue apparatus. Conceived, developed and built at KAPL, this new apparatus makes it possible to control and measure elastic and plastic strain developed in reactor materials under test. Conventional equipment controls only stress and strain within the elastic region.



# MILESTONES IN REACTOR TECHNOLOGY

## *at The Knolls Atomic Power Laboratory*

**HIGHLIGHT OPPORTUNITIES FOR PROFESSIONAL CAREERS.** Achievement of more efficient nuclear powerplants often hinges on knowledge of how reactor materials will behave under the highly specialized conditions to which they are exposed.

To obtain such information, KAPL Metallurgists and Engineers constantly explore new approaches to metallurgical problems in the nuclear field, often developing and using new equipment to get the answers they need. An example is the Strain-Fatigue Apparatus pictured above. SFA is providing KAPL Engineers and Scientists with valuable data on reactor-imposed conditions such as thermally-induced stresses and strains. Other areas of investigation include determining the effects of neutron bombardment and long-term creep on reactor materials. A milestone in reactor technology, SFA is the first apparatus used in AEC installations to study re-

sistance to cyclical stresses imposed by large thermal gradients encountered in reactor operation.

Pioneering is a continuous process at the Knolls Atomic Power Laboratory, carried on by engineers and scientists from many disciplines. Two projects now under way include the twin Water-Pressurized Reactors for the Submarine *Triton* and a powerplant under development for the world's first atomic destroyer.

Professional opportunities exist today for Nuclear Engineers, Physical Scientists and Metallurgists who can contribute to the flow of creative achievement at KAPL. U.S. Citizenship required; advanced degree and/or related experience preferred. Inquiries regarding current openings are invited. Please send your resume in confidence to Mr. A. J. Scipione, Dept. 41-MT



Richard L. Mehan is one of several metallurgists working on the development of new and more reliable reactor materials at KAPL. Dick Mehan joined General Electric after graduation from MIT in 1950 and came to KAPL in 1953, following two years of army service. He is also studying advanced metallurgy, evenings at Rensselaer Polytechnic Institute under G.E.'s advanced degree program.



*Knolls Atomic Power Laboratory*

OPERATED FOR A.E.C. BY

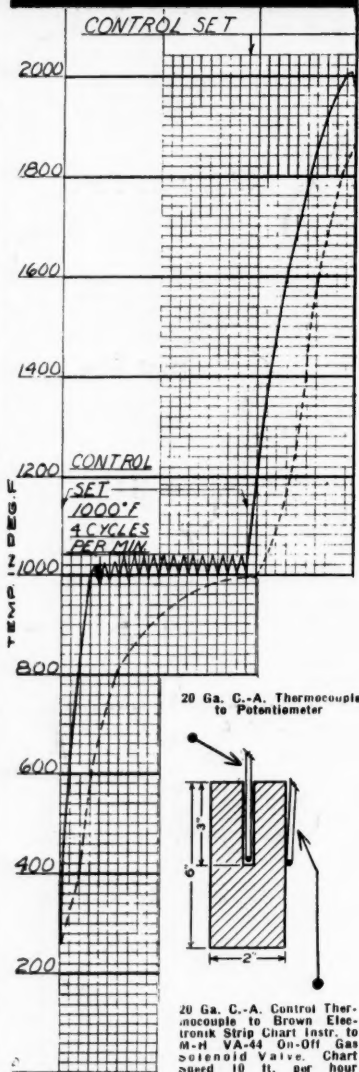
**GENERAL  ELECTRIC**

Schenectady, New York

# INSTANTANEOUS HEAT with Holden Combustion System

## INSPECT THIS PROVEN OPERATION AT OUR DETROIT PLANT

Firing Rate: 50,000 B.T.U. Per Sq. Ft.  
Blower Air = 117 C.F.M.



CORE - - - - SKIN

**THE HOLDEN LUMINOUS WALL FIRING SYSTEM IS A METHOD OF UNIFORMLY APPLYING INSTANTANEOUS HEAT TO A PART TO BE PROCESSED.**

### Low Thermal Storage

A POSITIVE SOURCE OF RADIATION, TRANSFERRING MAXIMUM AMOUNT OF HEAT DIRECTLY TO THE WORK WITH NEGLIGIBLE THERMAL STORAGE IN THE FURNACE STRUCTURE. THIS MEANS RAPID STARTING, RAPID COOLING AND RAPID RE-STARTING

### Flexibility

A TYPICAL EXAMPLE OF RAPID HEATING IS SHOWN ON THE GRAPH (Left). FIRING 50,000 BTU PER SQ. FT. THE FOLLOWING TEMPERATURES WERE OBTAINED—

1. Up to 1000° F. (10 min. lag—800 to 1000° F.)
2. Up to 1775° F. (3 min. lag)
3. 1775° F. to 2275° F. (3 min. lag)

CONVERSELY, THE REFRACTORY WALL HAS NO HEAT STORAGE SO WHEN GAS IS SHUT OFF AND AIR ALLOWED TO BLOW THROUGH FURNACE WALL, THE WALL IMMEDIATELY ASSUMES TEMPERATURE OF INCOMING AMBIENT AIR.

### Advantages

LUMINOUS WALL—INSTANTANEOUS HEATING OFFERS—

1. Greater over all heating efficiency—more than any other type gas furnace
2. 40% less fuel consumption—average day
3. Rapid furnace heating—temperatures of 1000 to 2000° F. obtained within time cycle of 1 to 10 min. using 50,000 BTU per sq. ft.
4. Rapid furnace cooling—no refractory spalling
5. Increased refractory life—graph shows tests conducted in unit over 3 years old operated at temperatures to 2300° F. without refractory replacement

### Increase Your Profits

MANY INDUSTRIAL HEATING PROCESSES USE A LARGE PROPORTION OF HEAT AND TIME IN ACHIEVING OPERATING TEMPERATURES DUE TO THERMAL STORAGE IN REFRACTORY LINING. REDUCE EXCESSIVE FUEL AND LABOR COSTS WITH HOLDEN LUMINOUS WALL AND MAKE EXTRA PROFITS! WRITE FOR TECHNICAL BULLETIN 209

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